Final

ENVIRONMENTAL ASSESSMENT
FOR
CONTINUED PERSONNEL RECOVERY TRAINING OPERATIONS WITHIN THE GULF OF MEXICO WTA

MOODY AIR FORCE BASE, GEORGIA

June 2010

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FINDING OF NO SIGNIFICANT IMPACT

ENVIRONMENTAL ASSESSMENT CONTINUED PR TRAINING OPERATIONS WITHIN THE GULF OF MEXICO WTA

Pursuant to Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1500-1508) implementing procedural provisions of the National Environmental Policy Act (NEPA) (Public Law 91-190, 42 U.S. Code [USC] 4321 et seq.), the U.S. Air Force (Air Force) gives notice that an environmental assessment (EA) has been prepared and an environmental impact statement (EIS) is not required for continued Personnel Recovery (PR) training operations being conducted by the 38th Rescue Squadron (38 RQS), 41 RQS, and 71 RQS from Moody Air Force Base (AFB) within the previously established Water Training Area (WTA) in the northern Gulf of Mexico..

1.0 PROPOSED ACTION

The EA was prepared by the Air Force to evaluate the potential environmental impacts of continued PR, previously known as Combat Search and Rescue (CSAR), training operations in the existing WTA within Apalachee Bay in the northeastern Gulf of Mexico. The WTA is currently used for training aircrews and associated PR personnel of the 38 RQS, 41 RQS, and 71 RQS based at Moody AFB, Georgia. The EA specifically addresses the Proposed Action of continued PR operations within the WTA, including:

- the use of HH-60 helicopters and fixed-wing aircraft (HC-130s),
- the use of training materials (e.g., lightsticks, sea dye packs, and flares),
- the use of surface vessels (i.e., Zodiac inflatable boat and Boston whaler), and
- in-water activities such as self-contained underwater breathing apparatus (scuba) operations, and the insertion and extraction of PR personnel.

Under the Proposed Action, the WTA established in 1999 by the Air Force would continue to be used to support PR training by the 41 RQS and 71 RQS and paradrop exercises by the 38 RQS. Enhanced training is necessary to maintain the PR capability of the 38 RQS, 41 RQS, and 71 RQS. Their primary mission is to provide worldwide, deployable long-range PR of downed aircrew members. Secondary missions include providing air rescue capability for Moody AFB and long-range civilian search and rescue capability for the region. These complex missions require distinct tasks and skills that involve frequent, repetitive training to maintain combat proficiency. The Proposed Action would best meet that need by continuing to use the existing WTA in the Gulf of Mexico.

The establishment of the WTA and associated CSAR, now known as PR, training operations by the 71 and 41 RQSs were assessed in a 1999 EA and associated Finding of No Significant Impact (FONSI) and current 38 RQS training operations were assessed in a 2006 Categorical Exclusion (CATEX). Formal consultation under section 7 of the Endangered Species Act (ESA) was conducted between the Air Force and National Marine Fisheries Service (NMFS) to address potential impacts to federally listed marine species within the action area, particularly sea turtles. A Biological Opinion (BO) was issued in December 1999. Since the December 1999 BO covered only a 10-year period and is due to expire in December 2009, in accordance with the BO, the Air Force requested reinitiation of formal section 7 consultation to reassess on-going training operations by the 71, 41, and 38 RQSs within the WTA. A Biological Evaluation (BE) was prepared to support the reinitiated section 7 consultation with NMFS. In accordance with NEPA, this EA was prepared to address potential impacts of continued PR operations within the WTA and will supplement the 1999 EA.

2.0 ALTERNATIVES CONSIDERED

No other action alternatives were found that would meet the purpose and need for the Proposed Action and that would utilize an existing WTA. Under the No-Action Alternative, the use of the existing WTA for PR training activities by Moody AFB personnel would cease. However, PR personnel would not be able to meet minimum training requirements and pilot proficiency training would be inadequate. Nonetheless, CEQ guidelines stipulate that the No-Action Alternative be analyzed to assess any environmental consequences that may occur if the Proposed Action is not implemented. Therefore, this alternative was carried forward for analysis in this EA.

3.0 SUMMARY OF ENVIRONMENTAL EFFECTS

In compliance with guidelines contained in NEPA, CEQ regulations, and Department of the Air Force regulations (32 CFR 989, *Environmental Impact Analysis Process [EIAP]*), this EA should only address those resource areas potentially subject to impacts; locations and resources with no potential to be affected need not be analyzed. In addition, the level of analysis should be commensurate with the anticipated level of environmental impact. Accordingly, the following resource areas were addressed in the EA: waste management and marine biological resources. Conversely, the remaining resource areas that are normally addressed in an EA were not carried forward for detailed analysis in this EA, as potential impacts were considered to be negligible, non-existent, or were addressed previously in the 1999 EA and associated FONSI for the establishment of the WTA and the 2006 CATEX for 38 RQS operations. The analysis contained within the 1999 EA/FONSI and 2006 CATEX are still considered to be valid as the type, number, and location of PR training operations being assessed in the current EA are the same. The main focus of the EA is to address potential impacts to marine biological resources, specifically impacts to species listed under the ESA, to support reinitiation of section 7 consultation with NMFS.

Under the Proposed Action within the WTA, the 38, 41, and 71 RQSs would continue to use up to 1,450 sea dye markers per year and up to 2,550 flares per year as marine location markers and the 38 and 41 RQSs would continue to use up to 14,000 lightsticks per year. Training activities associated with the Proposed Action would potentially affect some marine biological resources within the WTA. Use of sea dye packs and lightsticks may result in the incidental take of threatened and endangered sea turtles. Incidental take is defined as take that results from, but is not the purpose of, carrying out an otherwise lawful activity. To minimize chances of such take, formal ESA consultation with NMFS was completed and an incidental take permit was obtained that addresses use of the proposed WTA. The resulting 22 April 2010 BO from NMFS concurred with the Air Force's findings that the effects of the Proposed Action and potential cumulative effects are not likely to jeopardize the continued existence of loggerhead, Kemp's ridley, green, hawksbill, or leatherback sea turtles in the Atlantic Basin (including the Gulf of Mexico). The terms and conditions, and consultation-derived reasonable and prudent measures within the incidental take statement will be implemented. These include: (1) the Air Force shall continue to develop and improve their program aimed at helping to understand the dynamics and effects of marine debris ingestion by sea turtles and to decrease the interactions between sea turtles and marine debris, (2) to the maximum extent practicable, the Air Force shall decrease the amount of debris discarded due to the Proposed Action and monitor the effects of marine debris associated with the Proposed Action, and (3) the Air Force shall monitor the effects of the project on sea turtles. With implementation of these reasonable and prudent measures, impacts to marine biological resources would not be significant.

4.0 CONCLUSION

The attached EA was prepared and evaluated pursuant to NEPA and in accordance with CEQ regulations and 32 CFR 989, *The Environmental Impact Analysis Process*. I have concluded that continued PR training operations within the Gulf of Mexico WTA as proposed does not constitute a "major Federal action significantly affecting the quality of the human environment" when considered individually or cumulatively in the context of the referenced act, including both direct and indirect impacts. Therefore, no further study is required, and a Finding of No Significant Impact is thus warranted.

Gary W. Henderson

GARY W. HENDERSON, Colonel, U.S. Air Force
Commander, 23rd Wing

04 Nov 10
Date

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Acronyms and Abbreviations

38 RQS	38^{th} Rescue Squadron
41 RQS	41^{st} Rescue Squadron
71 RQS	71^{st} Rescue Squadron
AFB	Air Force Base
AGL	above ground level
BE	Biological Evaluation
BO	Biological Opinion
CATEX	Categorical Exclusion
CFR	Code of Federal Regulations
CRRC	Combat Rubber Raiding Craft
CSAR	Combat Search and Rescue
CSA-ML	Continental Shelf Associates, Inc. and Martel Laboratories, Inc.
EA	Environmental Assessment
ESA	Endangered Species Act
FFWCC	Florida Fish and Wildlife Conservation Commission
FPL	Florida Power and Light
ft	foot/feet
FLDEP	Florida Department of Environmental Protection
FWRI	Fish and Wildlife Research Institute
GSMFC	Gulf States Marine Fisheries Commission
hr	hour(s)
LATN	Low-Altitude Tactical Navigation
min	minute(s)
MSL	above mean sea level
NEPA	National Environmental Policy Act
nm	nautical mile(s)
nm^2	square nautical mile(s)
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NRC	National Research Council
NVGs	night vision goggles
NWR	National Wildlife Refuge
PJ	parajumper
PR	Personnel Recovery
RAMZ	rigging alternate method zodiac
sec	second(s)
STSSN	Sea Turtle Stranding and Salvage Network
SULMA	Special Use Land Management Area
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WTA	Water Training Area

EXECUTIVE SUMMARY

The Department of the Air Force (Air Force) proposes to continue Personnel Recovery (PR), previously known as Combat Search and Rescue (CSAR), training operations being conducted by the 38th Rescue Squadron (38 RQS), 41 RQS, and 71 RQS from Moody Air Force Base (AFB) within the previously established Water Training Area (WTA) in the northern Gulf of Mexico. This environmental assessment (EA) specifically addresses the Proposed Action of continued PR operations within the WTA, including the use of HH-60 helicopters and HC-130 fixed-wing aircraft and training materials, and conducting in-water activities. A detailed discussion of the on-going PR activities currently being conducted within the WTA is presented in Section 2.1.

This EA has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969 (42 U.S. Code [USC] 4321 et seq.), the Council on Environmental Quality (CEQ) regulations of 1978 (40 Code of Federal Regulations [CFR] 1500-1508), and Department of the Air Force regulations (32 CFR 989, *Environmental Impact Analysis Process [EIAP]*).

1.0 PROPOSED ACTION

The EA was prepared by the Air Force to evaluate the potential environmental impacts of continued PR training operations in the existing WTA within Apalachee Bay in the northeastern Gulf of Mexico. The WTA is currently used for training aircrews and associated PR personnel of the 38 RQS, 41 RQS, and 71 RQS based at Moody AFB, Georgia. The EA specifically addresses the Proposed Action of continued PR operations within the WTA, including:

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The establishment of the WTA and associated CSAR (now known as PR) training operations by the 71 and 41 RQSs were assessed in a 1999 EA and associated Finding of No Significant Impact (FONSI) and current 38 RQS training operations were assessed in a 2006 Categorical Exclusion (CATEX). Formal consultation under section 7 of the Endangered Species Act (ESA) was conducted between the Air Force and National Marine Fisheries Service (NMFS) to address potential impacts to federally listed marine species within the action area, particularly sea turtles. A Biological Opinion

(BO) was issued in December 1999. Since the December 1999 BO covered only a 10-year period and will expire in December 2009, in accordance with the BO, the Air Force requested reinitiation of formal section 7 consultation to reassess on-going training operations by the 71, 41, and 38 RQSs within the WTA. A Biological Evaluation (BE) was submitted to NMFS to support the reinitiated section 7 consultation. In accordance with NEPA, this EA has been prepared to address potential impacts of continued PR operations within the WTA and will supplement the 1999 EA.

2.0 ALTERNATIVES CONSIDERED

No other action alternatives were found that would meet the purpose and need for the Proposed Action and that would utilize an existing WTA. Under the No-Action Alternative, the use of the existing WTA for PR training activities by Moody AFB personnel would cease. However, PR personnel would not be able to meet minimum training requirements and pilot proficiency training would be inadequate. Nonetheless, CEQ guidelines stipulate that the No-Action Alternative be analyzed to assess any environmental consequences that may occur if the Proposed Action is not implemented. Therefore, the No-Action Alternative was carried forward for analysis in this EA.

3.0 SUMMARY OF ENVIRONMENTAL EFFECTS

In compliance with guidelines contained in NEPA, CEQ regulations, and Department of the Air Force regulations (32 CFR 989, *Environmental Impact Analysis Process [EIAP]*), this EA should only address those resource areas potentially subject to impacts; locations and resources with no potential to be affected need not be analyzed. In addition, the level of analysis should be commensurate with the anticipated level of environmental impact. Accordingly, the following resource areas were addressed in the EA: waste management and marine biological resources. Conversely, the remaining resource areas that are normally addressed in an EA were not carried forward for detailed analysis in this EA, as potential impacts were considered to be negligible, non-existent, or were addressed previously in the 1999 EA and associated FONSI for the establishment of the WTA and the 2006 CATEX for 38 RQS operations. The analysis contained within the 1999 EA/FONSI and 2006 CATEX are still considered to be valid as the type, number, and location of PR training operations being assessed in the current EA are the same. The main focus of the EA is to address potential impacts to marine biological resources, specifically impacts to species listed under the ESA, to support reinitiation of section 7 consultation with NMFS.

Under the Proposed Action within the WTA, the 38, 41, and 71 RQSs would continue to use up to 1,450 sea dye markers per year and up to 2,550 flares per year as marine location markers and the 38 and 41 RQSs would continue to use up to 14,000 lightsticks per year. Training activities associated with the Proposed Action would potentially affect some marine biological resources within the WTA. Use of sea dye packs and lightsticks may result in the incidental take of threatened and endangered sea turtles. Incidental take is defined as take that results from, but is not the purpose of, carrying out an otherwise lawful activity. To minimize chances of such take, formal ESA consultation with NMFS was completed and an incidental take permit was obtained that addresses use of the proposed WTA. The terms and conditions, and consultation-derived reasonable and prudent measures from the incidental take statement within the 22 April 2010 BO from NMFS will be implemented. Therefore, impacts to marine biological resources would not be significant.

FINAL
ENVIRONMENTAL ASSESSMENT FOR CONTINUED PERSONNEL RECOVERY TRAINING OPERATIONS WITHIN THE GULF OF MEXICO WTA BY MOODY AFB, GEORGIA

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CHAPTER 1
PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

The Department of the Air Force (Air Force) proposes to continue Personnel Recovery (PR), previously known as Combat Search and Rescue (CSAR), training operations being conducted by the 38th Rescue Squadron (38 RQS), 41 RQS, and 71 RQS from Moody Air Force Base (AFB) within the previously established Water Training Area (WTA) in the northern Gulf of Mexico. This environmental assessment (EA) specifically addresses the Proposed Action of continued PR operations within the WTA, including the use of HH-60 helicopters and HC-130 fixed-wing aircraft and training materials, and conducting in-water activities. A detailed discussion of the on-going PR activities currently being conducted within the WTA is presented in Section 2.1.

This EA has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969 (42 U.S. Code [USC] 4321 et seq.), the Council on Environmental Quality (CEQ) regulations of 1978 (40 Code of Federal Regulations [CFR] 1500-1508), and Department of the Air Force regulations (32 CFR 989, *Environmental Impact Analysis Process [EIAP]*).

1.2 BACKGROUND

1.2.1 Moody AFB

Moody AFB is located 10 miles northeast of the City of Valdosta in Lowndes and Lanier counties in south-central Georgia (Figure 1-1). Comprising approximately 11,000 acres of federally owned land, the installation includes the main base (5,039 acres), the adjacent Grand Bay Range (5,874 acres), and the Grassy Pond Recreational Annex (489 acres), located 25 miles southwest of the main base.

Moody AFB is home to the 23rd Wing (23 WG), which consists of six groups: 347th Rescue Group, 563rd Rescue Group (based out of Davis-Monthan AFB, Arizona and Nellis AFB, Nevada), 23rd Fighter Group, 23rd Mission Support Group, 23rd Medical Group, and 23rd Maintenance Group. The 23 WG is tasked to organize, train, and employ combat-ready pararescuemen or parajumpers (PJs), A/OA-10, HH-60, and HC-130 forces totaling 5,500 military and civilian personnel including geographically separated units in Arizona, Nevada, Florida, and North Carolina. The 23 WG executes worldwide close air support and PR operations in support of humanitarian interests, U.S. national security, and the global war on terrorism.

The 347th Rescue Group consists of the 38 RQS, 41 RQS with HH-60 helicopters, and 71 RQS with HC-130 aircraft. 71 RQS aircrews and pararescue personnel are trained in PR operations, as well as air refueling to support the 41 RQS mission. The primary mission of the 38 RQS, 41 RQS, and 71 RQS is to provide support for long-range rescue operations. In addition, these squadrons provide peacetime search and rescue capability under the national search and rescue plan.

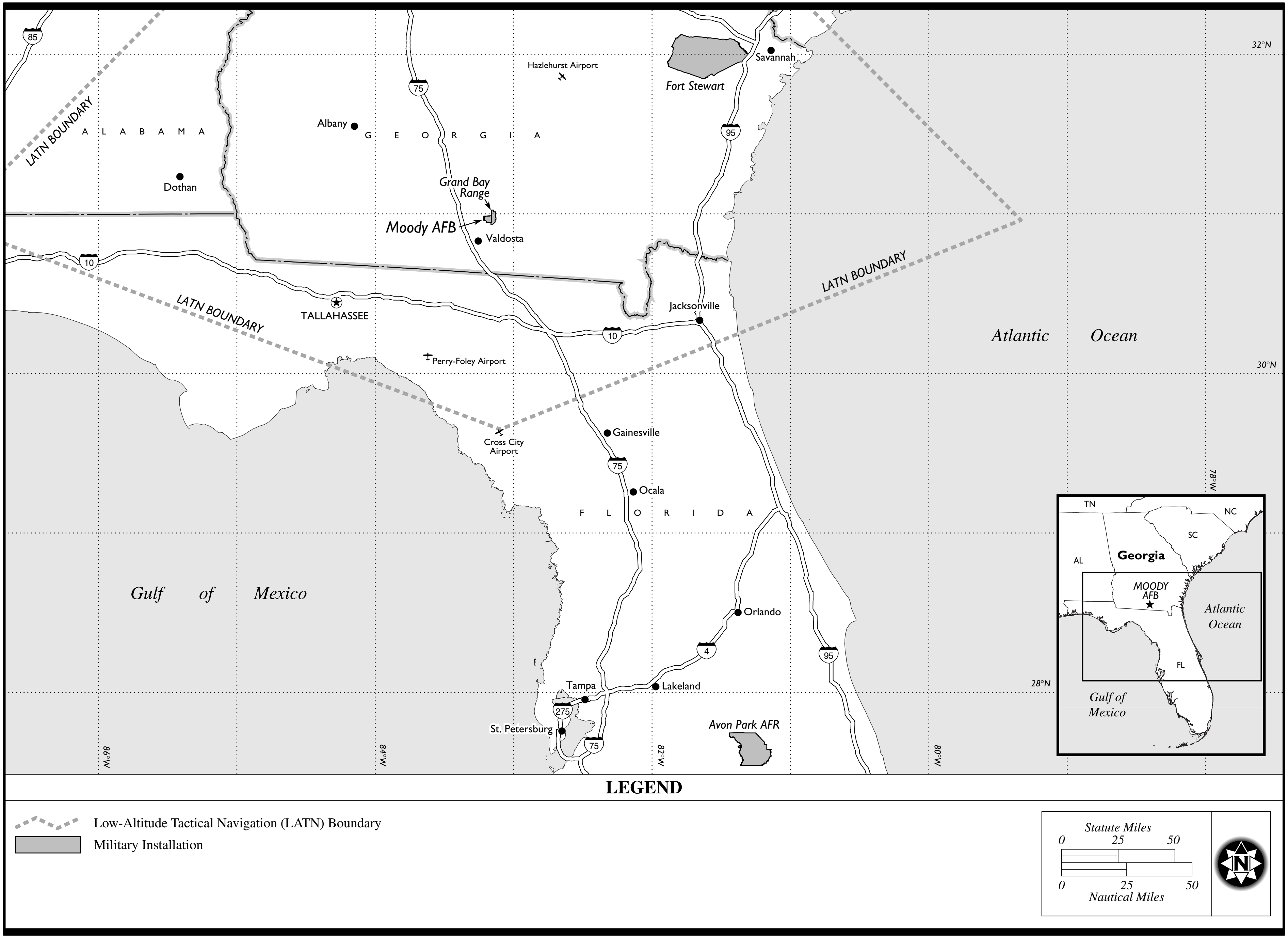

Figure 1-1

Location Map
Moody Air Force Base

1.2.2 Water Training Area (WTA)

The establishment of the WTA and associated CSAR (now known as PR) training operations by the 71 and 41 RQSs were analyzed in an EA under NEPA and a Finding of No Significant Impact (FONSI) was signed on 30 December 1999 (Air Force 1999). Current 38 RQS training operations were assessed by the Air Force in a Categorical Exclusion (CATEX) given that the nature and tempo of their training operations and potential impacts to marine fauna were similar to the 71 and 41 RQSs training operations that were covered under the previous NEPA documentation (Air Force 2006a).

The WTA covers approximately 175 square nautical miles (nm^2) in the Gulf of Mexico off the coast of northern Florida within Apalachee Bay, with the closest point of approach to land being 4 nm (Figure 1-2). Currently, 38 RQS, 41 RQS, and 71 RQS personnel from Moody AFB use the WTA for PR training. While PR regulations specify that overwater training must take place at least 100 yards offshore, training benefits are maximized at farther distances where pilots cannot use landmarks for visual orientation. Both HH-60 and HC-130 operations in the WTA are currently conducted at altitudes of 5,000 feet (ft) above mean sea level (MSL) and below.

1.2.3 Previous Environmental Documentation

As stated above, the establishment of the WTA and associated PR training operations by the 71 and 41 RQSs were assessed in an EA/FONSI (Air Force 1999) and current 38 RQS training operations were assessed in a CATEX (Air Force 2006a). Formal consultation under section 7 of the Endangered Species Act (ESA) was conducted between the Air Force and National Marine Fisheries Service (NMFS), St. Petersburg, Florida office to address potential impacts to federally listed marine species within the action area, particularly sea turtles. A Biological Opinion (BO) was issued on 22 December 1999 (NMFS 1999). Since the December 1999 BO covered only a 10-year period and is due to expire in December 2009, in accordance with the BO, the Air Force will request reinitiation of formal section 7 consultation to reassess on-going training operations by the 71, 41, and 38 RQSs within the WTA. In accordance with NEPA, this EA is being prepared to address potential impacts of continued PR operations within the WTA and will supplement the 1999 EA. A Biological Evaluation (BE) was also prepared to support the reinitiated section 7 consultation with NMFS.

1.3 Purpose of and Need for the Proposed Action

Under the Proposed Action, the WTA established in 1999 by the Air Force would continue to be used to support PR training by the 41 RQS and 71 RQS and paradrop exercises by the 38 RQS. Enhanced training is necessary to maintain the PR capability of the 38 RQS, 41 RQS, and 71 RQS. Their primary mission is to provide worldwide, deployable long-range PR of downed aircrew members. Secondary missions include providing air rescue capability for Moody AFB and long-range civilian search and rescue capability for the region. These complex missions require distinct tasks and skills that involve frequent, repetitive training to maintain combat proficiency. The Proposed Action would best meet that need by continuing to use the existing WTA in the Gulf of Mexico.

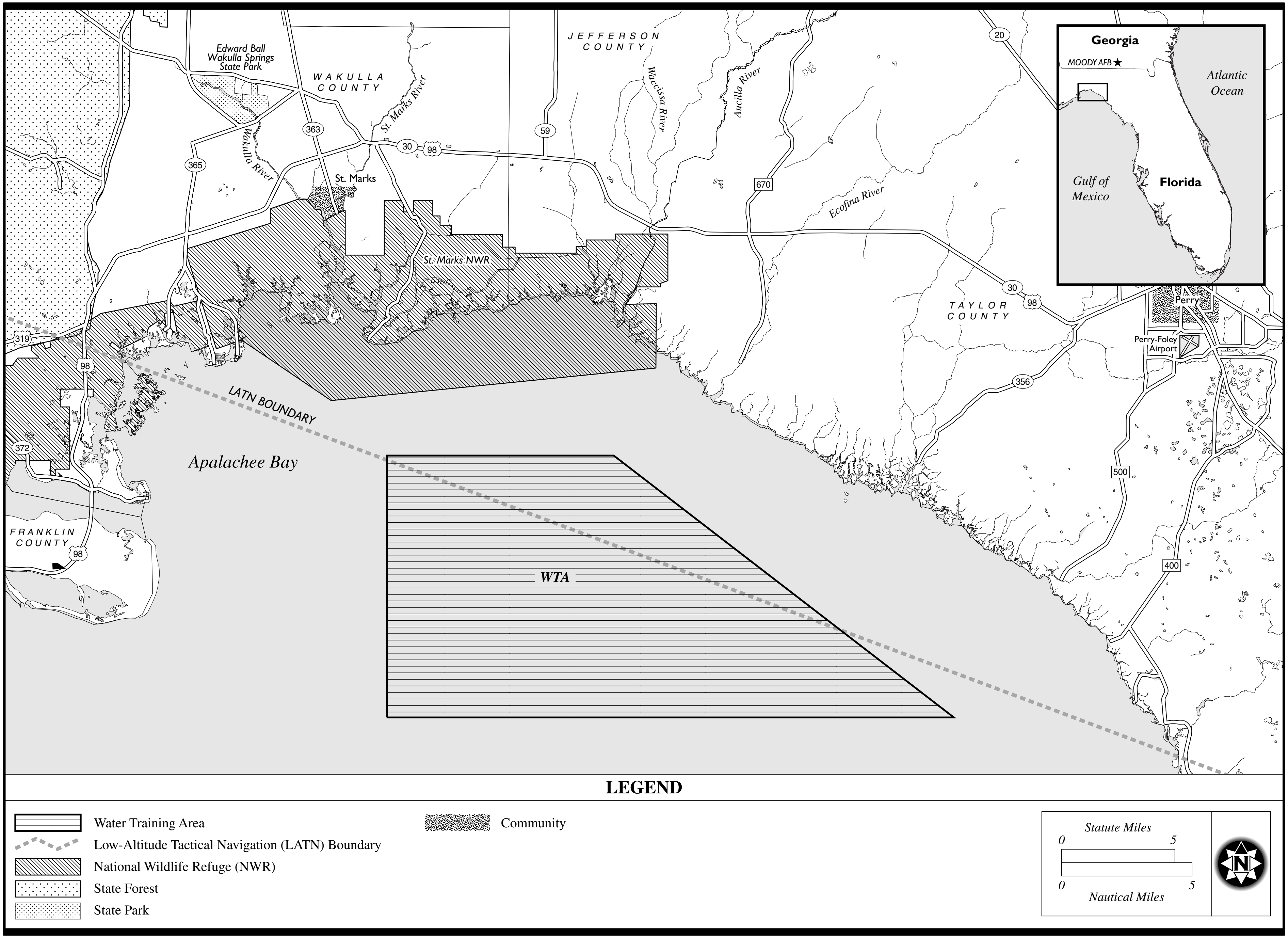

Figure 1-2
Water Training Area (WTA)

1.4 REGULATORY COMPLIANCE

A variety of laws, regulations, executive orders (EOs), and other types of requirements apply to federal actions and form the basis of the analysis presented in this EA. NEPA requires federal agencies to consider potential environmental consequences of proposed actions and enhance the environment through well-informed federal decisions. CEQ was established under NEPA to implement and oversee federal policy in this process. Other related federal regulations include AFI 32-7061, *The Environmental Impact Analysis Process*; EO 11514, *Protection and Enhancement of Environmental Quality;* and the ESA.

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CHAPTER 2
DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The Proposed Action is discussed in Section 2.1. Alternatives to the Proposed Action, including the No-Action Alternative, are described in Section 2.2. The Proposed Action would not require any new facility construction or renovation, and there would be no requirement for additional aircraft operations, aircraft, or personnel for the 38 RQS, 41 RQS, and 71 RQS.

2.1 PROPOSED ACTION

The Air Force proposes to continue PR training operations in the existing WTA within Apalachee Bay in the northeastern Gulf of Mexico. The WTA is currently used for training aircrews and associated PR personnel of the 38 RQS, 41 RQS, and 71 RQS based at Moody AFB, Georgia. This EA specifically addresses the Proposed Action of continued PR operations within the WTA, including:

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- the use of training materials (e.g., lightsticks, sea dye packs, and flares),
- the use of surface vessels (i.e., Zodiac inflatable boat and Boston whaler), and
- in-water activities such as self-contained underwater breathing apparatus (scuba) operations, and the insertion and extraction of PR personnel.

A detailed discussion of on-going PR activities currently being conducted within the WTA is presented below.

2.1.1 Aircraft Operations Terminology

Throughout this EA, two terms are used to describe aircraft operations. A *sortie* consists of a single military aircraft flight from takeoff through landing. The term *sortie-operation* is defined as the use of one airspace unit (such as a military operations area [MOA], restricted area, or WTA) by one aircraft. A sortie-operation applies to flight activities outside the Moody AFB airspace environment. Each time a single aircraft conducting a sortie flies in a different airspace unit, one sortie-operation is counted for that unit. Since under the Proposed Action there would be no change to airfield (Moody AFB) operations or operations within other airspace units previously assessed in the 1999 EA (Air Force 1999), the following discussion focuses only on sortie-operations within the WTA.

2.1.2 38 RQS WTA Operations

Approximately 70 paradrop exercises or ‘water deployments’ would be conducted in the WTA annually by the 38 RQS. Water deployments would consist of personnel jumps, deployment of a Combat Rubber Raiding Craft (CRRC) (an inflatable Zodiac boat), HH-60 helicopter water operations, and/or scuba qualification dives. A water deployment could involve all of these training activities in a single exercise or deployment, only one specific activity, or any combination. These water deployments would be split evenly between daytime and night operations. Specific training activities are described in detail below. All 38 RQS operations would occur concurrently with 41 and 71 RQS operations and do not necessitate additional aircraft operations.

Personnel Jumps. A surface support safety boat (27-ft Boston Whaler) departs a local St. Marks marina and transits to the WTA. Aircraft, either HH-60s or HC-130s, arrive over the WTA approximately 15 minutes (min) later. Radio contact is established between the safety boat and the aircraft, and the WTA is surveyed for the presence of sea turtles or marine mammals, and to confirm that there are no hazardous conditions in the area, such as fishing vessels, shrimp boats, etc. Once surveys are completed, the aircraft drops a paper streamer either from 1,500 ft or 3,000 ft depending on the type of parachute to be used during training. The streamer is used to determine the release point for jumpers and is approximately 20 ft long, made of crepe paper, and dissolves in water. Personnel then complete the jump into the WTA. Following the jump, personnel would be recovered either by the HH-60s or, if the personnel drops were from a HC-130, by the safety boat. To the maximum extent practicable, the safety boat would recover any expended equipment or debris from the training exercise that remains in the WTA and then return to the marina. The entire operation takes approximately 90 min and involves 3-8 persons per sortie utilizing either one HC-130 or two HH-60s.

CRRC Airdrop. The CRRC may be deployed from an HH-60 or HC-130 by one of three methods during PR training operations.

- Tethered Duck (T-Duck) method: the CRRC (with motor mounted) is deflated, rolled up, and stored inside the HH-60. Once at the WTA (and usually at 30 ft above MSL or less), the team lowers the boat into the water using a controlled belay. When the boat is in the water, the team deploys out the other door using a fast-rope, swims over to the boat, inflates it (using compressed air), starts the engine, and is underway. The T-Duck is the method typically used during current PR operations within the WTA.
- Kangaroo Duck (K-Duck) method: the CCRC (with motor unmounted) is secured to the underside of the HH-60. Once at the WTA (and usually at 10 ft above MSL or less) the CCRC is released and allowed to ‘free-fall’ from the HH-60 to the water. The team jumps in the water, swims to the boat, mounts and starts the engine, and is underway.
- Rigging Alternate Method Zodiac (RAMZ) method: the uninflated CRRC, outboard engine, fuel, and medical equipment) are bundled into a 4-ft cube and then parachuted out of an HC-130 from 3,500 ft. The equipment chutes are equipped with an automatic release, which separates the RAMZ from the chutes upon contact with water. Upon landing, the RAMZ package settles approximately 2 ft into the water. Three to four PJs exit the HC-130 6 seconds (sec) after the RAMZ is dropped, and they drop in the WTA downwind of the RAMZ. Once they land, they swim to the package, inflate the CRRC, and start the engine (approximately 5-10 min). After inflation, they use the CRRC to recover their chutes while the safety boat recovers the RAMZ packing material and chutes.

The CRRC drop is similar to the personnel jump in support requirements and procedures. The surface support safety boat departs a local marina and transits to the WTA. Aircraft, either HH-60s or HC-130s, arrive over the WTA approximately 15 min later. Radio contact is established between the safety boat and the aircraft, and the WTA is surveyed for the presence of sea turtles or marine mammals, and to confirm that there are no hazardous conditions in the area, such as fishing vessels, shrimp boats, etc. A second CRRC and an additional three to four PJs may be deployed during one exercise. However, due to logistical issues, it is highly unlikely that more than one HC-130 or HH-60 would be dropping CRRCs during a training operation. Once all equipment is recovered, personnel return to the local marina. The PJs may either pilot the CRRCs back to the marina, or the PJs are hoisted from the WTA by HH-60s and the Zodiacs are towed back to the marina by the safety boat. This operation takes approximately 2 hours (hr) to complete.

HH-60 Helicopter Water Operations. The surface support safety boat departs a local marina and transits to the WTA. HH-60s arrive over the WTA approximately 15 min later. Radio contact is established between the safety boat and the aircraft, and the WTA is surveyed for the presence of sea turtles or marine mammals, and to confirm that there are no hazardous conditions in the area, such as fishing vessels, shrimp boats, etc. Helicopter water operations only involve the helicopter, the safety boat, and PJs. The helicopter crew utilizes night vision goggles (NVGs) during night operations. The helicopter hovers about 10 ft above the water with 5-10 knots forward speed while three to six PJs jump from the helicopter in a procedure called "a low and slow." The helicopter moves away from the PJs to simulate departing the area. The helicopter returns to the PJs and hovers over them while a rope ladder is lowered. The PJs would climb the rope ladder and enter the aircraft, which then departs the WTA. The safety boat's sole purpose in this exercise is to provide a recovery means for the PJs in the event the helicopter cannot make the pickup or in the event of an emergency.

Scuba Qualification Dives. This operation is identical to the RAMZ drop, however the PJs also conduct scuba operations with the RAMZ training. Approximately 6 sec following the successful drop of the RAMZ package, three to four PJs with scuba equipment exit the aircraft and land downwind of the RAMZ. They swim to the package, inflate the raft, and start the engine. Additionally, during this exercise, two divers are in the water conducting scuba operations while two personnel remain within the RAMZ. The exercises include underwater search patterns, deep dives to a maximum depth of 135 ft, and navigational dives at about 20-ft depth and for a distance of 9,840 ft (3,000 meters). Search patterns include the use of a rope grid, which is recovered at the completion of the exercise. PJs recover their personal chutes while the safety boat recovers the RAMZ packing material and RAMZ chutes. Once all equipment is recovered, personnel return to a local marina. The PJs may either pilot the Zodiacs back to the marina, or the PJs are hoisted from the WTA by HH-60s and the Zodiacs are towed back to the marina by the safety boat. This operation takes approximately 3 hr to complete.

2.1.3 41 RQS WTA Operations

Currently, 41 RQS operations consist of helicopters flying to the WTA and performing PR training operations over a specific location within the WTA. The use of the WTA by HH-60 aircrews averages 9, 1-hr sortie-operations per week (approximately 37 per month, or 449 per year). Approximately 242 of these annual WTA sortie-operations are after dark (Table 2-1). While daytime training may involve the use of either one or two helicopters, flight operations after dark require the use of two helicopters to maximize flight safety.

Table 2-1. HH-60 and HC-130 Flight Profiles and Annual Sortie-Operations within the WTA

Flight Profiles	*HH-60 (41 RQS)*	*HC-130 (71 RQS)*
Sortie-Operations (week/year)	9/449	2/100
Avg. Minutes/Sortie-Operation	60	30
Avg. % Power (revolutions per min [RPM])	60	45
Avg. Knots Indicated Airspeed (KIAS)	90	125
% of Time at Altitudes (ft AGL)		
10 – 29	8	0
30 – 49	25	0
50 – 149	67	0
100 – 499	0	100

Sources: Air Force 1999; USACE 2008.

The helicopters transit to the WTA from Moody AFB at 500 ft above ground level (AGL) within the Moody Low-Altitude Tactical Navigation (LATN) area. A LATN area covers large areas of uncontrolled airspace and facilitates operational flexibility (flight patterns are not confined to narrow flight corridors and direction of flight is not restricted). Altitudes within the Moody LATN area are limited to between

100 and 1,500 ft AGL, with airspeed restrictions not to exceed 250 knots indicated airspeed (KIAS). A LATN area covers large areas of uncontrolled airspace and facilitates operational flexibility (flight patterns are not confined to narrow flight corridors and direction of flight is not restricted). The purpose of LATN areas is to conduct random visual flight rules (VFR) low-altitude navigation training. Military aircraft are required to follow all existing Federal Aviation Regulations while flying within a LATN area. Other nonparticipating civil and military aircraft may fly within a LATN area, but are required to maintain visual separation from other aircraft in visual meteorological conditions. Both military and civil pilots are responsible "to see and avoid" each other while operating in a LATN area. The FAA does not consider a LATN area to be special use airspace; therefore, formal airspace designation in accordance with FAA Handbook 7400.2 is not required.

Once within WTA boundaries, the helicopters operate between 10 and 200 ft MSL during the entire PR training operation. While a typical HH-60 sortie-operation consists of a helicopter entering the WTA and dropping to 100 ft MSL, an HH-60 conducts PR operations at varying altitudes during the maximum sortie-operation time of 1 hr. The helicopter would spend approximately 5 min at 10 ft MSL, 15 min at 30-50 ft MSL, and 40 min at 150 ft MSL. Flares are dropped during PR training exercises in the WTA and the smoke from the flares is used to check wind direction. Daytime PR training in the WTA involves the use of sea dye markers dropped from the helicopter to mark the location of a survivor. The markers also provide a navigational aid for the helicopter aircrew.

Since HH-60 aircrews train with NVGs after dark, WTA training operations also involve the use of lightsticks. Lightsticks are dropped from the helicopter to monitor the survivor's position relative to the helicopter. Lightsticks are used instead of flares because flares can blind pilots who are using NVGs, and flares could be used by the enemy in hostile locations to identify both the survivor's and the rescuer's location. Use of flares, sea dye markers, and lightsticks is summarized below.

During some of the training operations, PJs jump out of the helicopter to perform simulated search and rescue operations; the PJs are dropped at an altitude of approximately 10 ft MSL. Personnel drops and pickups associated with pararescue training operations use rope, rappel, and ladders while the helicopter hovers at 15 to 50 ft MSL. In all circumstances, HH-60 aircrews attempt to avoid boats and other watercraft by a minimum of 1 nm. In addition, aircrews make every reasonable effort to avoid contact or interaction with marine fauna in the WTA.

2.1.4 71 RQS WTA Operations

The 71 RQS also currently use the WTA for performing PR training operations and deploying PJs. The 71 RQS HC-130 aircraft transit to the WTA from Moody AFB within the Moody LATN area. Current use of the WTA by HC-130s is approximately 2 sortie-operations a week (8 per month, or approximately 100 per year) (Table 2-1). All HC-130 sorties are conducted during the day; there are no operations after dark. A typical HC-130 sortie-operation within the WTA consists of one aircraft operating between 150 and 500 ft MSL for approximately 30 min. After initial entrance into the WTA, a surveillance circle is flown at 300 to 500 ft MSL to check for vessels operating in the area. Once a clear area is identified, one flare is dropped to mark the position of a 'survivor'. Subsequent drops of smaller flares are then conducted to simulate the dropping of survivor kits to the person being rescued. The flares are typically dropped at altitudes of 250 to 350 ft MSL. Sea dye markers are also used to serve as navigational aids during PR training operations.

2.1.5 Lightsticks, Sea Dye Packs and Flares

2.1.5.1 Proposed Use of Lightsticks, Sea Dye Packs, and Flares within the WTA

Under the Proposed Action, the 38 RQS, 41 RQS, and 71 RQS would continue to use up to 1,450 sea dye packs per year within the WTA. The 41 and 71 RQSs would continue to use two types of flares (MK6 and MK25) as marine location markers up to 2,550 times per year. During night operations, the 38 and 41 RQSs would also use up to 14,000 lightsticks. Since lightsticks float and are not biodegradable, every practicable effort would be made to retrieve them at the completion of PR training operations in the WTA. However, Moody AFB records from over the last 10 years of PR operations within the WTA indicate that less than 25% of lightsticks are able to be retrieved by personnel involved in training operations. Estimated annual usage rates for these items are shown in Table 2-2.

Table 2-2. Proposed Annual Lightstick, Flare, and Sea Dye Usage in the WTA

	Lightsticks	*Sea Dye Markers*	*Flares* MK25	*MK6*
38 RQS	3,000	250	0	0
41 RQS	11,000	700	175	175
71 RQS	0	500	1600	600
Total	14,000	1,450	2,550	

Sources: Air Force 1999; U.S. Army Corps of Engineers (USACE) 2008; Moody AFB 2009.

2.1.5.2 Description of Lightsticks, Sea Dye Packs, and Flares

Lightsticks

Lightsticks are 6 inches long, approximately 0.5 inch in diameter, and constructed of high-density polyethylene that is not considered to be easily biodegradable. Illumination provided by lightsticks is generated by a chemical reaction that takes place when two solutions are allowed to mix. To prevent the reaction from occurring prematurely, one of the solutions is stored in a very thin glass capsule that is easily broken by flexing or bending the tube. Once the tube is broken, the two chemicals are allowed to mix, and illumination occurs. Cyalume is the active ingredient that creates the illumination associated with lightstick activation. Dimethyl phthalate is a component of cyalume and possesses a moderate potential to affect some aquatic organisms (Eastman Corporation 1999).

Marine Location Dye Markers (M59 Sea Dye Packs)

The M59 is a marine location dye marker consisting of a heat-sealed plastic laminate bag (about 34 x 17 x 15 inches) filled with 22 ounces of uranine, a non-hazardous liquid dye composed of soluble sodium salt of fluorescein. The dye, which is not toxic or hazardous, is designed to mark the location of objects in the water. The plastic bag is dropped into the water from a minimum height of 50 ft at static or moving speeds. Upon hitting the water, the bag ruptures, scattering the enclosed dye to form a brilliant, fluorescent emerald green slick approximately 20 ft in diameter. The slick is visible within a 10-mile radius at an altitude of 3,000 ft MSL for an average of 2 hr. While the dye disappears within 2 hr, the plastic bag or pieces thereof, could remain suspended in the water column, sink to the bottom, or wash onshore.

Marine Location Markers (Flares)

The MK6 Mod 3 Marine Location Marker (flare) consists of four pyrotechnic candles contained in a square wooden block (about 18 x 17 x 26 inches) with a flat metal nose plate attached. There are four flame and smoke escape holes in the forward end of the signal; each hole is capped and sealed with tape. The MK6 flare uses a pull friction igniter, covered by adhesive tape, and is located in the center of the tail end of the body. The friction and igniter are launched by a sharp pull, either by hand or by a lanyard attached to the structure of the aircraft. The igniter charge initiates a delay fuse, which, after a 90-sec interval, ignites the first candle. When the candle begins to burn, the resulting gas pressure forces the metal cap out of the escape hole and breaks the adhesive tape seal, allowing gases to escape and burn. As the first candle burns out, a fuse is ignited which ignites the next candle unit. The successive ignition is repeated until all four candle-units have burned out. The total burning time is approximately 40 min.

The MK25 Mod 3 Marine Location Marker (flare) consists of an aluminum body (about 55 x 55 x 41 inches) containing a pyrotechnic composition, an electric squib, and a saltwater-activated battery. The base of the flare contains a battery, a safety arm feature that seals the battery cavity, and battery cavity ports. The MK25 flare is launched by rotating base plates from the ‘safe’ to the ‘armed’ position to expose the battery cavity ports. When saltwater enters the battery cavity through the ports, water acts as an electrolyte, activating the saltwater battery. The battery develops sufficient current to initiate an electric squib that ignites a starter mix, which in turn ignites the pyrotechnic composition. Gas pressure forces a valve from the nose of the marker and emits a yellow flame and white smoke for 13 to 18 min.

2.1.6 Summary of Aircraft Operations

Estimated weekly and annual sortie-operations within the WTA by the 41 RQS and 71 RQS and associated flight profiles for HH-60s and HC-130s would remain the same as those previously assessed in the 1999 EA (Air Force 1999) (Table 2-1). Current 38 RQS operations are conducted concurrently with 41 RQS or 71 RQS operations and no additional aircraft sortie-operations are necessary.

2.2 ALTERNATIVES

No other action alternatives were found that would meet the purpose and need for the Proposed Action and that would utilize an existing WTA. Per 32 Code of Federal Regulations (CFR) 989, the environmental effects of the No-Action Alternative will be evaluated in the EA. Under the No-Action Alternative, the use of the existing WTA for PR training activities by Moody AFB personnel would cease. However, PR personnel would not be able to meet minimum training requirements and pilot proficiency training would be inadequate.

2.3 SPECIAL CONSERVATION MEASURES TO BE INCORPORATED INTO THE PROPOSED ACTION

Prior to the initiation of PR operations, the WTA is surveyed by aircraft for the presence of sea turtles or marine mammals, and to confirm that there are no hazardous conditions in the area, such as fishing vessels, etc. All PR operations would take place at least 1 nm from any observed marine mammal or sea turtle detected during the initial aerial reconnaissance of the WTA. All sea turtles would be avoided during the transit of the safety boat to and from the WTA and St. Marks marina. Since lightsticks float and are not biodegradable, every practicable effort would be made to retrieve as many as possible at the completion of each PR training operation. However, Moody AFB records from over the last 10 years of PR operations within the WTA indicate that less than 25% of lightsticks are able to be retrieved by personnel involved in training operations.

CHAPTER 3
AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the existing conditions for resources potentially affected by the Proposed Action described in Chapter 2.0. Analysis of the affected environment provides a framework for understanding the direct, indirect, and cumulative effects of the Proposed Action. The following sections present definitions of each resource, a description of the expected geographic scope of potential impacts, known as the region of influence (ROI), and current conditions within the ROI.

In compliance with guidelines contained in NEPA, CEQ regulations, and Department of the Air Force regulations, this EA should only address those resource areas potentially subject to impacts; locations and resources with no potential to be affected need not be analyzed. In addition, the level of analysis should be commensurate with the anticipated level of environmental impact. Accordingly, the following resource areas have been addressed in this EA: waste management and marine biological resources. Conversely, the remaining resource areas that are normally addressed in an EA were not carried forward for detailed analysis in this EA, as potential impacts were considered to be negligible, non-existent, or were addressed previously in the 1999 EA and associated FONSI for the establishment of the WTA (Air Force 1999) and the 2006 CATEX for the 38 RQS operations (Air Force 2006a). The analysis contained within the 1999 EA/FONSI and 2006 CATEX are still considered to be valid as the type, number, and location of PR training operations being assessed in this EA are the same. The main focus of this EA is to address potential impacts to marine biological resources, specifically impacts to species listed under the ESA, to support reinitiation of section 7 consultation with NMFS. Therefore, the following resources are not addressed in this EA:

- *Airspace Management*. Sortie-operations by HH-60 and HC-130 aircraft would be flown VFR throughout the WTA. Use of the WTA requires no special use airspace designations since activities would be at low altitudes and low air speeds (below 2,000 ft AGL] and slower than 250 knots). Existing see-and-avoid procedures and avoidance measures for civil aviation airports would remain unchanged. Airspace schedule coordination, processes, and procedures currently used to manage the existing military and civilian airspace are well established and would need no modification to support continued PR operations within the WTA. Although published federal airways and military airspace are adjacent to and traverse the WTA, there would be no increase in airspace use. Therefore, implementation of the Proposed Action would not significantly impact general aviation in the region.
- *Socioeconomics and Environmental Justice*. Implementation of the Proposed Action or the No-Action Alternative would not affect socioeconomic resources and would comply with EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-income Populations*, and EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. The Proposed Action would occur within the boundaries of the WTA; no impacts to schools, children, or minority populations would occur; and the scale of the Proposed Action would not result in noticeable direct or indirect effects to the economy. As no permanent population centers, low-income communities, or minority communities exist within or immediately adjacent to the WTA, no communities would be susceptible to adverse socioeconomic or environmental justice impacts.
- *Recreation*. Recreational resources within or adjacent to the WTA would not be impacted by the Proposed Action as all PR training operations would avoid all civilian personnel within the WTA, including recreational and commercial fishermen, boaters, scuba divers, and other

recreational users of the marine environment. In addition, recreational activities would be allowed to occur concurrently with PR training and would not be restricted by military operations. Therefore, there would be no impacts to recreation with implementation of the Proposed Action.

- *Safety*. The analysis of potential safety issues conducted for the establishment of the WTA is still valid and included elements of the Proposed Action with the potential to affect safety relative to the degree to which they could increase or decrease safety risks to aircrews and the general public. Potential safety issues included increased potential for Bird-Aircraft Strike Hazard (BASH), aircraft mishaps, and increased exposure to civilians from unretrieved items expended in the marine environment (e.g., lightsticks and flares). As the continued use of the WTA would not result in an increase in aircraft operations or a change in the materials used during PR training operations within the WTA, the continued use of the WTA for PR training operations would not result in significant impacts to safety within the WTA.
- *Visual Resources*. Visual resources are the natural and manufactured features that constitute the aesthetic qualities of an area. These features form the overall impression that an observer receives of an area or its landscape character. Implementation of the Proposed Action or No-Action Alternative would not adversely affect visual resources as continued PR training activities within the WTA would continue to be brief and temporary and located greater than 4 nm from shore. Therefore, there would be no impacts to visual resources with implementation of the Proposed Action.
- *Transportation*. Implementation of the Proposed Action would not require a change in current transportation activities within or adjacent to the WTA. All PR training activities would avoid any transiting recreational or commercial boats in the area, would be temporary, and would occur greater than 4 nm from shore. Therefore, there would be no impacts to transportation with implementation of the Proposed Action.
- The Proposed Action is consistent with established land use, aircraft safety zones, functionality, and environmental protection zones. In addition, no changes to existing land use would occur with implementation of the Proposed Action.
- *Land Use*. Under the Proposed Action, HH-60 and HC-130 aircraft would continue PR operations over offshore waters. The Proposed Action does not represent a new type of activity, and activities within the WTA would be consistent with existing land and shoreline use in the area. As previously assessed in the 1999 EA, noise levels associated with WTA operations would continue to be well below the threshold for compatibility with recreational areas (Federal Interagency Committee on Urban Noise 1980). Temporary noise levels generated from the proposed action would not be high enough to disrupt activities taking place within WTA or adjacent coastal Special Use Land Management Areas (SULMAs). As a result of the continued PR training proposed within the WTA, a number of MK25 and MK6 flares, sea dye plastic wrappers, and lightsticks would be generated as waste and abandoned in the WTA annually (refer to Section 3.1, *Waste Management*). The use of these products and unrecovered items in the marine environment has the potential to affect the aesthetic quality of the environment. However, this quantity of waste would not result in significant impacts to land ownership or land status, general land use patterns, or land management practices in the WTA or adjacent SULMAs as these materials would be quickly dispersed throughout the training area and beyond. Therefore, implementation of the Proposed Action would not result in significant impacts to land use or be inconsistent with the State of Florida's coastal zone management program.

- *Geological Resources*. The proposed action would have no impacts to geological resources as all proposed activities would be conducted in the marine environment with no impact to the seafloor. Therefore, there would be no impacts to geological resources with implementation of the Proposed Action.
- *Terrestrial Biological Resources*. The Proposed Action would have no impacts to terrestrial biological resources as all proposed activities would be conducted in the marine environment. Therefore, there would be no impacts to terrestrial biological resources with implementation of the Proposed Action.
- *Air Quality*. As the type, number, and location of PR training operations being assessed in this EA are the same as those CSAR training operations assessed in the 1999 EA (Air Force 1999), and as air quality conditions within the WTA and adjacent areas has not changed, there would be no impacts to air quality with implementation of the Proposed Action.
- *Water Resources*. The Proposed Action would have no impacts to surface and groundwater conditions as all proposed activities would be conducted in the marine environment. Therefore, there would be no impacts to water resources with implementation of the Proposed Action.

3.1 WASTE MANAGEMENT

The ROI for waste management includes the marine environment of the WTA including the surrounding marine environment and nearby stretches of coastline. The proposed action would generate various types of waste materials within the ROI. Specifically, this would include the following training materials used within the WTA: sea dye packs, flares, and lightsticks. This section describes existing waste generation within the ROI, with an emphasis on items similar to those that would be generated by the proposed action.

3.1.1 Affected Environment

Sea dye packs, flares, and lightsticks are not considered hazardous wastes. However, in sufficient numbers they can present a marine debris issue and have potential aesthetic impacts on marine and coastal environments. While these materials are not considered to be hazardous to humans, sea dye packs have the potential to affect some marine organisms (refer to Section 3.2, Marine Biological Resources).

Waste materials in the Gulf of Mexico are generated by a variety of sources. However, this section focuses on the ROI described above and on materials similar to those that would be generated by the proposed activities. Although this represents only a fraction of the total waste streams generated within the ROI, comprehensive background information for all wastes is not readily available. The identified sources below contribute the majority of current wastes similar to those that would be generated by the proposed action.

Lightsticks, marine location dye markers (sea dye packs), and marine location markers (flares) are currently used by regional military operating groups (Navy and Air Force), Coast Guard groups, and civilians, within the Gulf of Mexico for training, rescue, recreational, or commercial activities. Regional military operating groups use some or all three of the items for training and rescue operations. Some Coast Guard groups use the items in their training and rescue operations. Lightsticks are used by fishermen to attract fish and by recreational divers to enhance visibility both at night and in deep-water conditions. Efforts are sometimes made to recover these items, either at sea or during beach cleanups. Depending on local marine and atmospheric conditions, some waste materials generated outside the ROI can be moved into the area via ocean currents. The eventual fate of the items depends on oceanographic conditions, the physical properties of the items, and the state of the items in the marine environment at a given time. Within the Gulf of Mexico, commercial shipping and recreational boating are also responsible for adding debris to the marine environment.

Although NMFS concluded in their BO on the establishment of CSAR training (now known as PR training) over the Gulf of Mexico by Moody AFB rescue squadrons that the proposed training activities would have no direct effects on sea turtles, they did conclude that there was a strong possibility of indirect effects. These indirect effects include the potential ingestion of plastic debris remaining in the marine environment upon completion of each training activity. The plastic debris includes light sticks and plastic packaging from spent sea dye packs (NMFS 1999).

One of the conditions of the Incidental Take Statement of the BO was that the Air Force conduct a study reviewing current knowledge of the sources, amount, and fate of marine debris (particularly plastics) in the Gulf of Mexico and the potential impacts of marine debris to threatened and endangered sea turtles (NMFS 1999). The resulting marine debris study focused on existing data including published, peer-reviewed literature; unpublished federal and state agency and private, non-governmental reports (e.g., The Ocean Conservancy, formerly the Center for Marine Conservation [CMC]); information from existing government agency databases (e.g., Florida Fish and Wildlife Conservation Commission [FFWCC] and NMFS); and interviews with experts in marine debris and sea turtles in the Gulf; no new data were collected (Moody AFB 2002).

Based on CMC International Coastal Cleanup Data Reports from 1995-1999, land sources accounted for over 65% of the marine debris collected from coastal counties in Florida. Identifying sources (e.g., commercial fishing activities, oil and gas platforms) of marine debris is difficult because much of what washes ashore has no distinguishing or unique identifying characteristics. For example, packaging such as plastic bags and bottles could have originated either from fishing vessels as galley waste or from beach users. Considerable fishing activity occurs in the vicinity of most survey beaches in Florida, yet only 5% of plastic debris was clearly attributable to that source. Therefore, the contribution of fishing-related debris is probably underestimated (Moody AFB 2002).

3.1.2 Environmental Consequences

3.1.2.1 Proposed Action

Under the Proposed Action within the WTA, the 38, 41, and 71 RQSs would continue to use up to 1,450 sea dye markers per year and up to 2,550 flares per year as marine location markers and the 38 and 41 RQSs would continue to use up to 14,000 lightsticks per year (Table 2-1). Since lightsticks float and are not biodegradable, every practicable effort would be made to retrieve them at the completion of PR training operations in the WTA.

<u>Lightsticks</u>

Military (Navy and Air Force) and Coast Guard groups within the Gulf use lightsticks and their derivatives (chemlights, cyalumes) at times during the course of training and rescue operations. Fishermen use lightsticks for attracting fish (lightsticks are attached to the nets and lines), and recreational divers use lightsticks for illumination and safety purposes. Where feasible, some users attempt to recover a portion of the used lightsticks. In addition, cleanups have been sponsored by various organizations to clean up marine debris (including lightsticks) that washes up on beaches. Oceanographic conditions within the Gulf concentrate the majority of lightsticks in certain areas offshore (Florida Sea Grant Program 1999). Lightsticks are constructed of high-density polyethylene and are not considered to be easily biodegradable; therefore, they can persist for long periods of time in the marine environment. Due to their physical properties, lightsticks rarely sink to the ocean bottom (this usually only occurs if they are punctured and subsequently filled with water).

Cyalume is the active ingredient that creates the illumination associated with lightstick activation. Dimethyl phthalate is a component of cyalume and possesses a moderate potential to affect some aquatic organisms (Eastman 1999). Although it does not meet the criteria for a hazardous waste, hydrogen peroxide, one of the lightstick constituents, is an irritant to mammalian skin and mucous membranes at high concentrations. Due to the high-density plastic used to seal the lightsticks, it is unlikely that the materials contained within the lightstick would ever be discharged to the environment. However, should this ever occur, no harmful effects to aquatic organisms would result, due to the fact that when diluted with a large amount of water, neither dimethyl phthalate nor hydrogen peroxide are expected to result in adverse affects on marine organisms. When conditions allow, personnel involved in training operations within the WTA attempt to recover lightsticks within their immediate vicinity at the completion of each exercise.

Sea Dye Packs

Sea dye contained within marine location markers is a liquid that does not persist in the marine environment for more than 2 hr. However, the plastic bag that contains the sea dye is constructed of a molded, phenolic material. Even after a decade of weathering, the biodegradation of polyethylene (plastic) occurs very slowly (Hakkarainen and Albertsson 2004). Similar plastic bags and pieces of plastic bags have been found on the ocean bottom, or partially buried in the ocean sediments (Ocean Conservancy 2009).

Marine Location Markers (Flares)

During the course of training and rescue operations, military operating groups (Navy and Air Force), Coast Guard groups, and mariners within the Gulf occasionally use flares. When deployed, the materials within the flare ignite and burn, emitting smoke and thereby marking the desired location. The MK6 flare is designed to completely incinerate its wooden housing and internal contents. The smaller MK25 flare is composed of an aluminum housing containing the flare materials. Upon combustion of the internal flare materials, the aluminum housing would sink.

When flares work to performance specifications, they do not present a hazard to humans or to the marine environment. In the instances when the flares fail to ignite or do not burn completely, they can float on the ocean surface and eventually get washed onshore. If unused marine location flares wash onto beaches within the ROI, they can present a potential hazard to humans due to their explosive components. Marine location flares used by the Air Force and the Navy are marked with warning language and instructions to contact an appropriate safety officer.

Toxicity. The MK6 and the MK25 ignition compositions contain small amounts of lead dioxide. Lead dioxide is a recognized poison and a powerful oxidizer that is a severe eye, skin, and mucous membrane irritant. When the ignition composition is heated, it emits toxic fumes of lead. The MK25 also contains phosphorous, a substance that is explosive, flammable, and toxic. Combustion products from the MK6 and MK25 are considered to be severely toxic, and inhalation of the fumes should be avoided. As the flares would be deployed in a dynamic environment, possible impacts associated with deployment would not be hazardous. This is because the pollutants would be quickly and effectively reduced to insignificant concentrations through dispersion and advection. Dispersion is a physical process by which pollutants are diffused as they move downwind or downgradient, and results in an associated decrease in contamination. Advection is a physical process by which pollutants are transported away from the source area by physical processes such as wind. The potential for exposure to smoke generated by the flares would be minimal due to the remoteness of the WTA. Should a flare fail to deploy and be encountered by someone, instructions printed on the flares instruct the finder to contact appropriate authorities to remove the item.

Reliability Rates. The reliability rates (a percentage of the time successful deployment of the marine location markers occurs) for the MK6 and MK25 marine location markers are between 90 and 95%. Every 3 years, the flares undergo lot reliability tests in order to ensure a high reliability rate. Should a lot reliability test result in a reliability rate less than 88%, the flares are removed from service. At the current reliability rate (90-95%), it is estimated that WTA activities could potentially result in the deposition of 127 to 254 unexpended marine location markers into the marine environment annually. A small percentage of MK6 and MK25 flares could fail to deploy, and could remain on the surface of the ocean. Depending on oceanographic conditions, the state of the flare, and the distance from shore that they are deployed, marine location markers that do not deploy successfully could reach the beach environment. Generally, as marine location markers are used closer to shore, the potential for failed marine location markers to end up at a beach environment increases. Due to the chemical and physical properties comprising the marine location markers, failed marine location markers are considered "unexploded ordnance." Marine location flares used by the Air Force and the Navy are marked with warning language and instructions to contact an appropriate safety officer.

<u>Past PR Operations in the WTA and Usage of Training Materials</u>

As part of the terms and conditions of the 1999 BO (NMFS 1999), NMFS outlined annual reporting requirements to track the use of lightsticks and sea dye packs within the WTA during PR training operations. Table 3-1 presents a summary of the total annual usage of lightsticks and sea dye packs during PR training operations within the WTA from 2000 thru 2009.

Table 3-1. Annual Usage of Lightsticks and Sea Dye Packs within the WTA during PR Training Operations (2000-2009)*

Year	*Lightsticks*	*Sea Dye Packs*
2000	2,755	33
2001	1,919	45
2002	535	30
2003	1,560	96
2004	2,285	216
2005	2,320	79
2006	400	100
2007	1,935	195
2008	6,912	192
2009	2,250	117
9-yr Total	22,871	1,103
Annual Avg.	2,287	110
Annual Max.	6,912	216
Proposed Max. Annual #s Assessed in 1999 EA and BO	11,000	1,200

Sources: Air Force 1999; NMFS 1999; Air Force 2001, 2002, 2003, 2004, 2005, 2006b, 2007, 2008, 2009, 2010.

It should be noted that in no single year during the previous 10 years of PR operations within the WTA did the Air Force approach the proposed annual numbers of lightsticks or sea dye packs that were assessed in the original EA and associated section 7 consultation. That is, the proposed maximum number of lightsticks that were assessed for their potential to impact sea turtles within the WTA was 11,000 per year, yet the maximum number used in any 1 year was only 6,912, or an average of approximately 2,300/year. Similarly, the maximum number of sea dye packs proposed for use per year was 1,200 and the total used for the entire 10-year period was only 986, or approximately 100/year.

The resulting operations tempo and materials usage over the 10 years from 2000 through 2009 has been lower than anticipated because of post-9/11 events, particularly the resultant conflicts in Iraq and Afghanistan. When the WTA was initially established, the Air Force was not assuming extended tours of duties in these areas. The PR operations being assessed in this EA and those assessed in the previous EA are conducted in marine environments (i.e., WTA). As the current war efforts are taking place in desert and mountainous areas, the need to conduct PR training in a WTA is not a priority. The annual usage of lightsticks and sea dye packs that were in the original EA and resulting BO reflect best-case training scenarios assuming little to no overseas deployments and maximum WTA training effort.

3.1.2.2 No-Action Alternative

Under the No-Action Alternative, the use of the existing WTA for PR training activities by Moody AFB personnel would cease. However, PR personnel would not be able to meet minimum training requirements and pilot proficiency training would be inadequate. Therefore, the expenditure of lightsticks and marine location markers would not occur and no additional waste streams would be added to the ROI.

3.2 MARINE BIOLOGICAL RESOURCES

3.2.1 Affected Environment

The purpose of this section is to describe the marine environment and marine biological resources associated with the WTA. This section is comprised of three major subsections: 1) characterization of the marine environment; 2) invertebrates, fish, and sea turtles; and 3) marine mammals.

The project area is within the Big Bend region of Florida which extends from Anclote Key northwestward to Ochlockonee Point in the Panhandle region and includes the coastal waters of Pasco, Hernando, Citrus, Levy, Dixie, Taylor, Jefferson, and Wakulla counties. The action area for the Proposed Action consists of the marine habitats of the WTA within Apalachee Bay in the northeastern Gulf of Mexico and bordering Franklin, Wakulla, Jefferson, and Taylor counties.

3.2.1.1 Oceanographic Conditions

This subsection includes a description of marine water quality; depth; temperature and salinity characteristics; and general and local circulation based on previously published data. Temperature and salinity would not be affected by any project activity but are important to the later descriptions of marine animal distribution. Currents are important in determining the dispersal pattern of lightsticks and other project-related debris.

Water Quality. The overwhelming proportion of contaminants in the Gulf marine environment is attributed to river discharge. Because of its size, the Mississippi/Atchafalaya system is the major source of contaminants to the Gulf. Most of this flow is carried to the west, diverting contaminants away from the eastern Gulf. Marine water quality in the action area is considered to be excellent. The Big Bend area has been described as one of the least polluted coastal regions of the continental United States. The rivers discharging into Apalachee Bay carry relatively low concentrations of contaminants which, when combined with their level of discharge, results in very low contaminant levels in the marine environment. In addition, coastal zone sources of pollution in the study are greatly diminished due to the low human population in the region. However, the Fenholloway River, a tributary to Apalachee Bay, is an exception to this generalization, receiving discharges from an industrial facility that are high in color and contain elevated levels of sulfate, biochemical oxygen demand (BOD), suspended solids and nutrients. These discharges have caused localized reductions in water clarity and seagrass coverage in portions of Apalachee Bay (Dawes et al. 2004).

Temperature and Salinity. Sea surface temperatures in the northeastern Gulf of Mexico undergo seasonal cycles with highs of 84-86°F occurring in summer (July-August) and dropping to 55-57°F by mid-winter (January-February). Surface temperatures in the Apalachee Bay-Cedar Key area are some of the highest reported for the entire Gulf of Mexico in summer and among the lowest in winter. These values may fluctuate by several degrees depending upon particular climatic and oceanic conditions for any given year. Year-to-year variations in minimal winter surface temperatures along the coast, for example, are directly related to the intensity and frequency of winter storms. Stratification in coastal waters within the 66-ft contour is minimal year-round with bottom temperatures generally being several degrees cooler than surface values (Leipper 1954; National Oceanographic and Atmospheric Administration [NOAA] 1985; Harkema et al. 1991; 1992; 1993; 1994a, b).

As compared to temperature, salinities in the upper 165 ft of the water column of the offshore Gulf are quite stable throughout the year at about 36 parts per million (Leipper 1954). Most of the deviation from this norm comes in nearshore coastal areas that are influenced by seasonally variable freshwater discharges. Freshwater input to the Big Bend area comes primarily from the Apalachicola and Suwannee Rivers, with secondary input from the Ochlockonee River, discharging into western Apalachee Bay. Peak discharge occurs primarily in April and May with the lowest levels of discharge occurring from August through November (NOAA 1985).

Currents. Circulation in the Gulf of Mexico is controlled by global rotation, topography, wind, freshwater runoff, and the Loop Current. The Loop Current is the dominant feature affecting surface currents in the eastern Gulf of Mexico and almost all currents throughout the Gulf are affected to some degree by its eddy currents. The Loop Current is generated when Caribbean oceanic water flows northward into the Gulf of Mexico via the Yucatan Channel. After penetrating the Gulf, the current turns east and then flows south to exit the Gulf via the Straits of Florida. As both the openings are in the southeastern sector of the Gulf, this flow pattern results in an anticyclonic (clockwise) loop configuration that causes surface water to generally flow to the south along the mid and outer continental shelf of western Florida. This southerly flow is assumed to be also characteristic of shallower areas, such that there would be a net southerly flow all along the coast, including nearshore flows from west to east and then south in the Apalachee Bay area. These southerly currents are typically strongest during winter. In summer, the Loop Current typically does not penetrate as far north as during winter. Under these conditions, flows along the west Florida coast from Tampa Bay northward are to the north along the Florida peninsula, and from east to west in Apalachee Bay. However, these flows are very weak (NOAA 1985).

Bottom Composition and Bathymetry. The distribution of bottom sediments from Apalachee Bay to Tampa Bay is characterized by a narrow band of quartz sand from the shore out to a depth of 33 to 66 ft

(Darnell and Kleypas 1987) (Figure 3-1). The outer half to two-thirds of the shelf is covered with biogenic carbonate sand—the hard shell remains of calcareous fauna such as mollusks, sponges, coral, algae, and formanifera. Between the offshore carbonate and nearshore quartz is a band of mixed carbonate/quartz sand. The bottom of the WTA is comprised almost exclusively of quartz sand.

Depth in the WTA ranges from approximately 6 ft along the northeastern boundary to over 24 ft along the western and southwest margin of the WTA (Figure 3-2). Patchy shoals as shallow as 16 ft can be found along the western margin of the WTA amid surrounding depths of 20 to 24 ft. While there are scattered, low-relief rock outcrops in the Apalachee Bay area, there are no large-scale areas of coral reefs or high-relief topographic features within the WTA (Lynch 1954; Darnell and Kleypas 1987).

3.2.1.2 Marine Flora

The Big Bend portion of the Gulf Coast is unique in that it is an extensive area, with no offshore barrier islands, where a number of rivers, creeks, and marshes discharge directly into the Gulf of Mexico. It is also one of the few examples of a ‘zero-energy’ coastline, with average breaker heights of less than or equal to 1.5 inches and little littoral transport of sand. Factors contributing to the low-energy characteristics of the area include a wide and gently sloping shelf, divergence of approaching wave trains into a large coastal concavity, the location of the coast in a generally upwind direction, and the wave dampening effects of old submerged beaches and seagrass meadows (Dawes et al. 2004). Marshes and mud flats typical of low-energy areas in the eastern and northern Gulf of Mexico characterize most of the shoreline from Apalachee Bay to Tampa Bay. The exceptions are sandy beaches located at the points of land on each side of the mouth of Ochlochkonee Bay and in the Cedar Key area.

The Big Bend region, one of Florida’s remaining pristine areas of coastline, is a unique zero-energy coastline and contains Florida’s second-largest near-shore seagrass beds that stretch approximately 150 miles from Ochlockonee Bay south to Tarpon Springs. The region has received relatively little research and management attention. Aerial photography taken during the 1990s revealed that the South Florida region contained the majority (1.4 million acres or 65%) of the Gulf coast’s seagrass coverage, followed by the Big Bend (612,000 acres or 28%), Gulf Peninsula (5%), and Panhandle (2%) regions (Dawes et al. 2004).

The Big Bend Seagrass Aquatic Preserve was established in 1985 to provide protection and management of the nearshore seagrass beds found within the Big Bend area and covers approximately 945,000 acres (Florida Department of Environmental Protection [FLDEP] 2006). Approximately 25-30% of the WTA falls within the Big Bend Seagrasses Aquatic Preserve (Figure 3-3). However, the WTA contains a relatively small amount of seagrass beds that occur in the region, primarily along the eastern border.

As is the case with most Caribbean seagrass beds, the composition of the Big Bend coverage varies with depth. Turtle grass (*Thalassia testudinum*) and, to a lesser extent, manatee grass (*Syringodium filiforme*) and shoal grass (*Halodule wrightii*), are found in waters less than 33 ft deep. The densest beds are formed by turtle and manatee grasses which support high primary production rates and provide food and shelter to numerous invertebrate and fish species (Continental Shelf Associates, Inc. and Martel Laboratories, Inc. [CSA-ML] 1985; NOAA 1985; Darnell and Kleypas 1987).

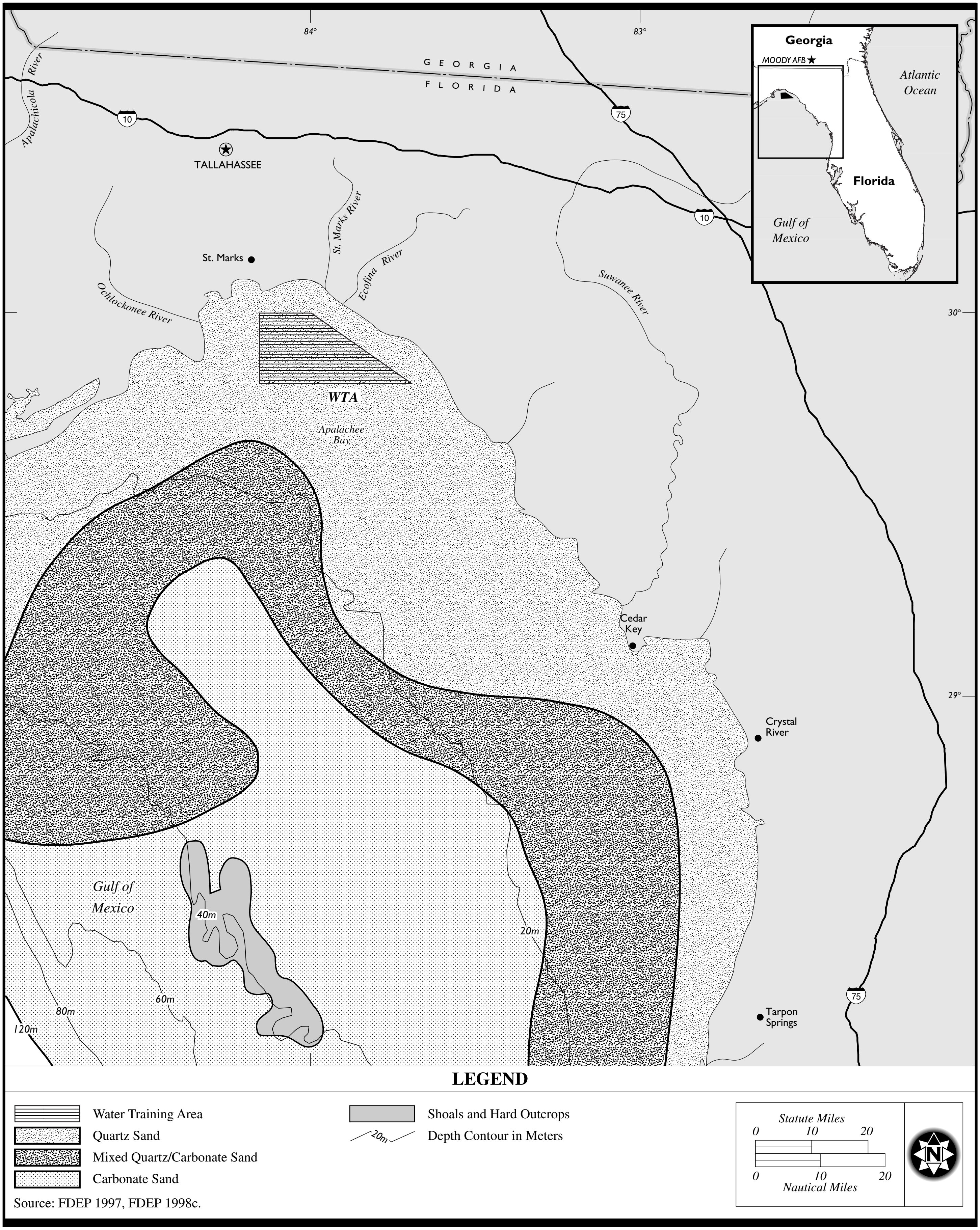

Figure 3-1
Distribution of Bottom Features of Apalachee Bay and Northwest Florida Shelf

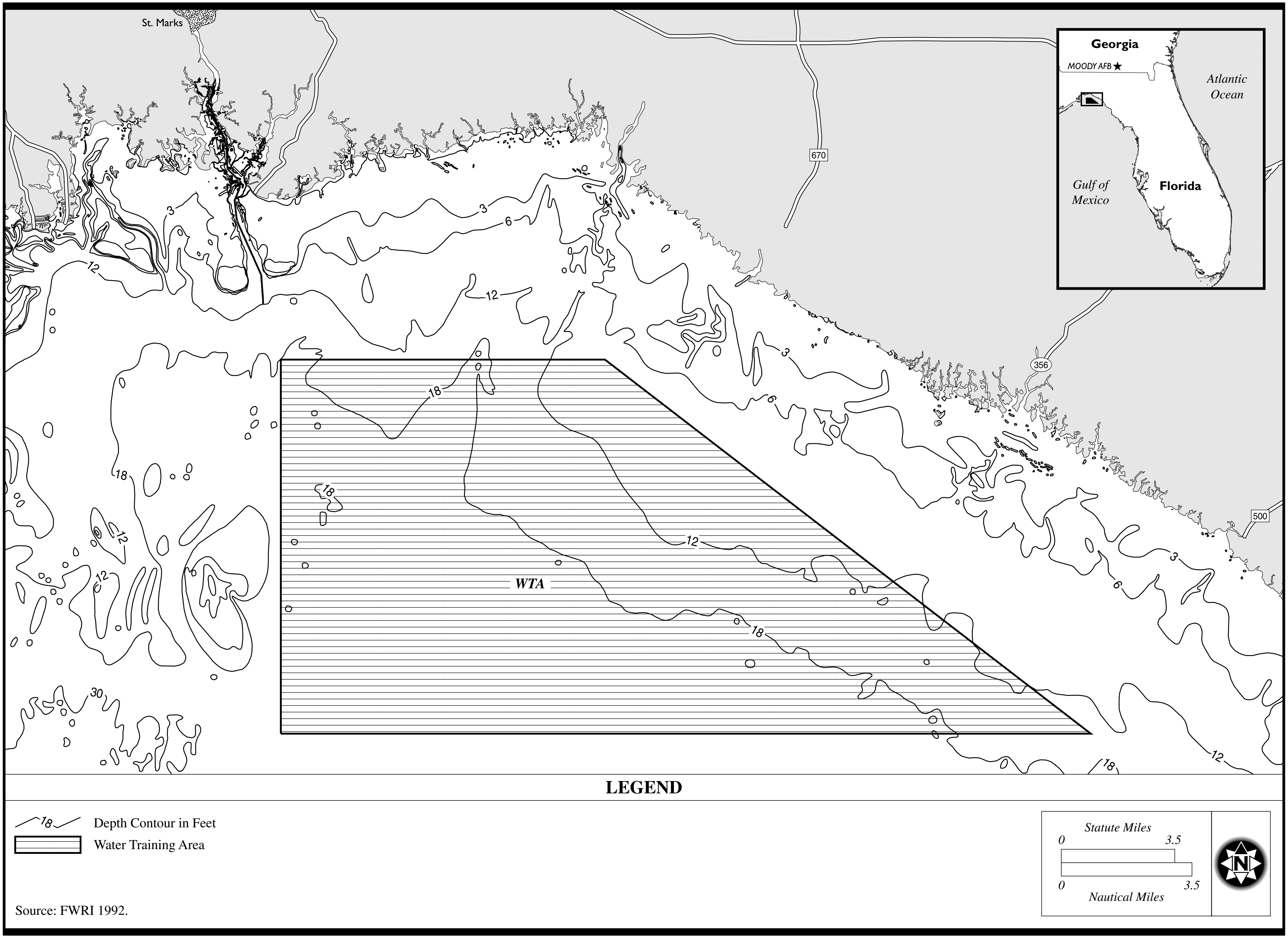

Figure 3-2
Bathymetry in the Vicinity of the WTA

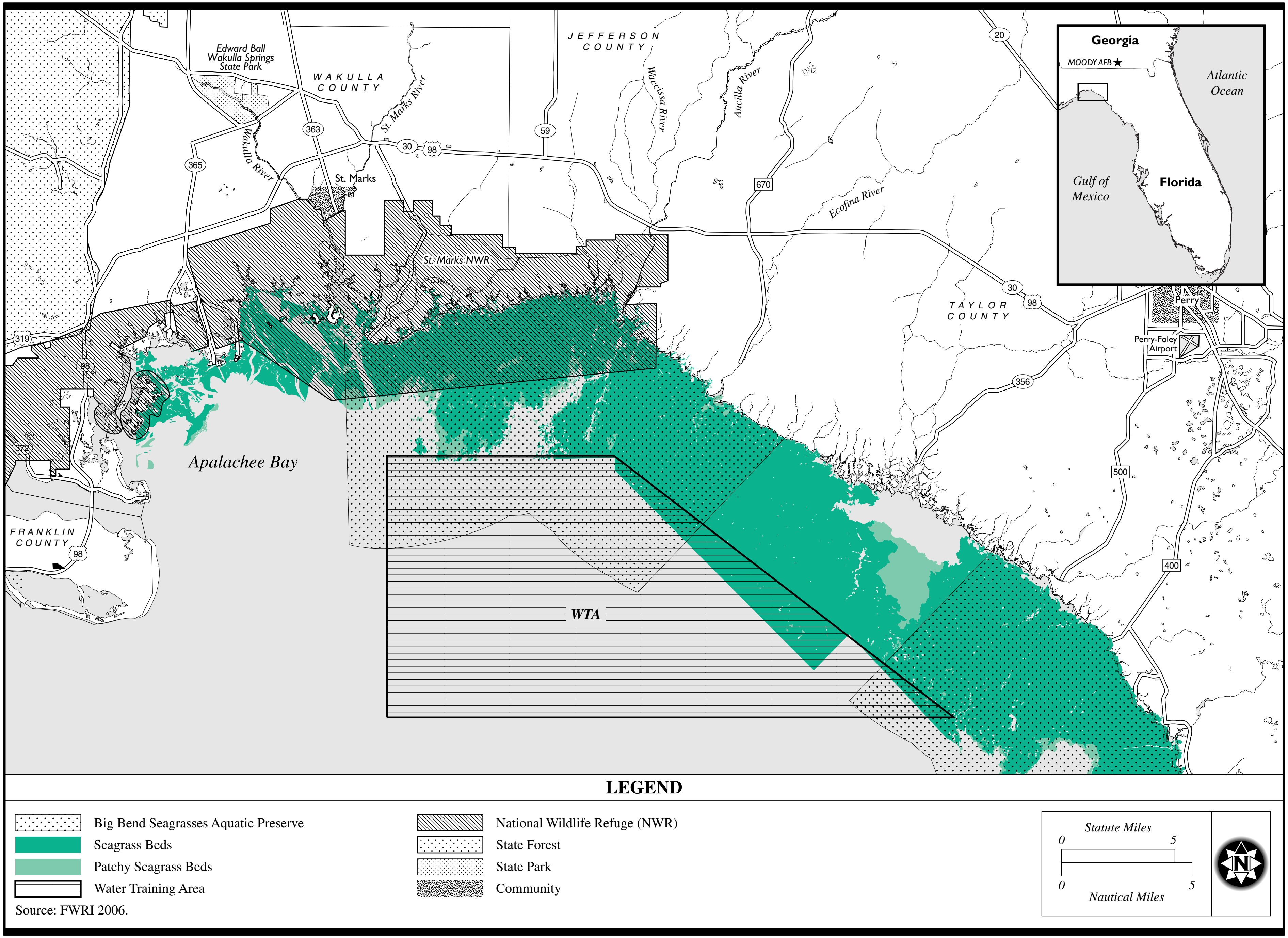

Figure 3-3
Distribution of Seagrasses and the Big Bend Seagrasses Aquatic Preserve within the WTA

3.2.1.3 Marine Fauna

Primary marine fauna in the study area include shellfish, finfish, sea turtles, and marine mammals. The principal offshore commercial fisheries in Apalachee Bay are directed at stone crabs, blue crabs, and shrimp; oysters are harvested from area bays. ESA-listed species include the Gulf sturgeon, five species of sea turtles, and one marine mammal.

<u>Invertebrates</u>

Penaeid Shrimp. Commercial shrimp in the Gulf of Mexico belong to the genus *Penaeus* and are represented by three species: brown shrimp (*P. aztecus*), white shrimp (*P. setiferus*), and pink shrimp (*P. duorarum*). Brown shrimp are found west of Pensacola year round with the exception of fall when concentrations extend as far east as Cape St. George at depths greater than or equal to 200 ft. The western continental slope off Florida is inhabited by adult brown shrimp year-round and the nearshore coastal areas from Apalachee Bay to Tampa Bay are classified as major year-round nursery areas (NOAA 1985).

White shrimp are rare throughout the eastern Gulf of Mexico except for isolated populations, one west of the Alabama-Florida border and the other associated with Apalachicola Bay. White shrimp are not found along the western Florida coast south of Cape St. George. A distinct population of pink shrimp is associated with the west Florida Shelf from Cape St. George to the Florida Keys. In winter, they are widely distributed inside the 200-ft contour at low densities. In spring and summer, the population separates into a northern and southern component. In the north, the heaviest concentrations are associated with coastal seagrass beds with peak concentrations west of Tampa Bay. In fall, pink shrimp again occupy most of the shelf from Apalachee Bay southward with the heaviest concentrations offshore of Tampa Bay (NOAA 1985; Darnell and Kleypas 1987).

American Oyster. Populations of the American oyster (*Crassostrea virginica*) are found in the large estuarine bays and sounds of the Gulf of Mexico including most of the Florida coast. The species is sedentary and attaches to hard substrates such as firm mud/shell bottoms and reefs. Rapid changes in water temperature trigger mass spawning which may occur several times a season. Oyster larvae drift for several weeks before attaching to hard substrates. Oysters are commercially and recreationally harvested under state regulations in almost every location where they occur. The fishery for this species is the fourth largest in the Gulf of Mexico. There is a commercial oyster fishery that operates in Apalachee Bay from September to May (NOAA 1985).

Stone Crab. Stone crab (*Menippe mercenaria*) are found in nearshore waters throughout the Gulf of Mexico including the Florida coast from Apalachee Bay to Tampa Bay. Juveniles live in estuaries among rock and shell substrates while mature crabs may move offshore. Stone crabs are commercially harvested from Tampa Bay south to the Florida Keys and in Apalachee Bay. The stone crab fishery is the largest of the commercial fisheries in the WTA with as many as 11,000 crab pots being distributed throughout Apalachee Bay. Harvested crabs have a single claw removed and then are released. The missing claw eventually regenerates (NOAA 1985).

Blue Crab. Blue crab (*Callinectes sapidus*) are found in the Gulf of Mexico from Florida to the Yucatan. It inhabits most coastal shores and estuaries and offshore areas to a depth of 115 ft. Blue crabs are omnivorous, feeding on benthic invertebrates, fish, carrion, and detritus. The blue crab commercial fishery is one of the largest (by volume) in the Gulf of Mexico, and this species is considered to be among the most valuable crabs in the western Atlantic. They support important recreational fisheries throughout estuarine areas. There are major commercial blue crab fisheries in Apalachee Bay (NOAA 1985).

Finfish

Demersal fish inhabit shallow freshwater and estuarine environments and benthic areas in deeper offshore shelf waters. Demersal fish habitat is varied and related to a number of environmental factors such as primary production, bottom type, and local hydrography. There can be distinct changes in community makeup as one moves from shallow brackish-water embayments to deeper, more marine, offshore waters; from sandy bottom to mud bottom to hard-rock or coral substrate; and from denuded areas to zones rich in sessile plant life. This section deals primarily with the estuarine and inshore shelf populations (less than 50 ft deep) of western Florida. Darnell and Kleypas (1987) reported a total of 347 identifiable demersal fish species representing 80 families from the eastern Gulf of Mexico continental shelf. Much of the high demersal fish density in Apalachee Bay can be attributed to the 12 most abundant species (Table 3-2). In most cases, the densities of these 12 species in the Apalachee Bay area were higher than anywhere else in the eastern Gulf of Mexico. Collectively, these data suggest that the seagrass beds unique to the Apalachee Bay/Tarpon Springs region may represent an important habitat that supports many fish species.

The most abundant species reported for the eastern Gulf of Mexico was the pinfish, being twice as abundant as the second most encountered species. The pinfish is one of the most common inshore fishes in the Gulf except in the highly turbid brackish waters of western Louisiana (Hoese and Moore 1998).

Table 3-2. Abundant Demersal Fish Species Collected in the WTA

Family	*Common Name*	*Scientific Name*
Syngnathidae	Dusky pipefish	*Syngnathus floridae*
Serranidae	Black sea bass	*Centropristis striata*
Gerreidae	Silver jenny	*Eucinostomus gula*
Haemulidae	White grunt Pigfish	*Haemulon plumieri* *Orthopristis chrtysoptera*
Sparidae	Spottail pinfish Pinfish	*Diplodus holbrooki* *Lagodon rhomboides*
Sciaenidae	Silver perch Spot	*Bairdiella chrysoura* *Leiostomus xanthurus*
Balistidae	Fringed filefish Planehead filefish	*Monacanthus ciliatus* *Monacanthus hispidus*
Diodontidae	Striped burrfish	*Chilomycterus schoepfi*

Source: Darnell and Kleypas 1997.

While all demersal fish species are an integral part of the Gulf of Mexico ecosystem and, more specifically, the seabeds of the western Florida coast, none of the 12 abundant species reported for the WTA are of significant commercial or recreational value. All 12 species are widespread along the Atlantic and Gulf of Mexico coasts and their high densities in the WTA likely do not represent isolated populations or area-specific subspecies.

3.2.1.4 Special-Status Species

Seven ESA-listed species potentially occur within the WTA or vicinity: Gulf sturgeon, five species of sea turtles, and West Indian manatee (Table 3-3). In accordance with section 7 of the ESA, a Biological Evaluation (BE) is being prepared to support formal consultation between the Air Force and NMFS.

Table 3-3. Special-Status Species Potentially Occurring in the Gulf of Mexico within the WTA

Common Name (Scientific Name)	*Status** *Federal/Florida*
FISH	
Gulf sturgeon (*Acipenser oxyrinchus desotoi*)	T/SSC
Smalltooth sawfish (*Pristis pectinata*)	E/ -
SEA TURTLES	
Loggerhead (*Caretta caretta*)	T/T
Green (*Chelonia mydas*)	E/E
Leatherback (*Dermochelys coriacea*)	E/E
Hawksbill (*Eretmochelys imbricata*)	E/E
Kemp's ridley (*Lepidochelys kempii*)	E/E
MARINE MAMMALS	
West Indian manatee (*Trichechus manatus*)	E/E

Notes: *E = Endangered, SSC = State Species of Concern, T = Threatened.

<u>Gulf Sturgeon</u>

Listed by the U.S. Fish and Wildlife Service (USFWS) and NMFS as threatened in September 1991, the Gulf sturgeon it is a geographically disjunct subspecies of the Atlantic sturgeon (*A. mitchill*). Population declines were primarily due to heavy commercial and recreational fishing for their eggs and meat, and habitat destruction including the damming of rivers (NMFS 2009c).

Gulf sturgeon occur in most major river systems from the Mississippi River to the Suwannee River, Florida, including the Apalachicola River and the Ochlockonee River in western Apalachee Bay (Wooley and Crateau 1985). While population estimates throughout its range are presently unknown, the population inhabiting the Suwannee River is believed to be the largest Gulf sturgeon population among coastal rivers in the Gulf of Mexico (NMFS 2009c).

Gulf sturgeon less than 2 years old remain within river and estuarine systems year-round while sub-adults and adults venture out into estuaries in winter. There is considerable evidence of sturgeon inhabiting estuarine habitats, and tagging studies in the Apalachicola and Suwannee rivers generally demonstrate a high probability of recapture in the same river in which fish were tagged. Nevertheless, limited catch and tag recovery data also indicate some intra-riverine movement within Florida coastal waters. Four radio-tracked sturgeon spent a week 3 miles offshore of the Suwannee River in October 1991. Of 3,700 Gulf sturgeon tagged in the Suwannee River, all but 2 of the nearly 700 recaptured fish were recovered in the Suwannee River (USFWS et al. 1995).

Mud and sand bottoms and seagrass communities are believed to be important marine habitats for sturgeon. Sturgeon feed on a variety of benthic invertebrate fauna including amphipods, polychaete and oliogochaete annelids, brachiopods, crustacea, and lancelets (USFWS et al. 1995).

Smalltooth Sawfish. The smalltooth sawfish was listed as endangered by NMFS in 2003. Primary factors contributing to the listing include habitat degradation and loss, pollution, increased sedimentation and turbidity, and accidental commercial fisheries bycatch (Navy 2007, NMFS 2009d).

Smalltooth sawfish are commonly found in shallow subtropical-tropical estuarine and marine waters. The species utilizes bottom habitats such as deep holes in sand or muddy sand and can be found inhabiting coral reefs, limestone hard-bottom, and sponge bottoms. They are typically found close to shore in shallow water and feed mostly on fish and some crustaceans (Navy 2007, NMFS 2009d).

In the U.S. the only remaining population occurs off of Southern Florida, with the Everglades National Park as the center of its distribution. Sightings of the species have occurred within the vicinity of the WTA near St. Marks extending along the northern Gulf of Mexico to nearly the Florida-Alabama border (Navy 2007). Due to their preference for shallow, nearshore waters, they are not expected to occur within the WTA

Sea Turtles

Green Sea Turtle. The green sea turtle is listed as threatened under the ESA except for the breeding populations in Florida, which are classified as endangered. The green sea turtle is a circumglobal species found in tropical and subtropical waters. The genus *Chelonia* is often divided into two species: the East Pacific green turtle (*C. agassizi*), also known as the black sea turtle, which is found in the eastern Pacific Basin from Baja California south to Peru and west to the Galapagos Islands; and the green turtle (*C. mydas,*) in the remainder of the global range. Current threats include loss of nesting habitat, death as fisheries bycatch, and poaching (National Research Council [NRC] 1990; USFWS and NMFS 1991).

In U.S. Atlantic waters, small numbers of green sea turtles nest in the U.S. Virgin Islands and in Puerto Rico and in somewhat larger numbers in Florida primarily along the southeast coast in Brevard, Indian River, St. Lucie, Palm Beach, and Broward counties. Nesting season takes place from April through September with an incubation period of approximately 2 months. Upon hatching, young green turtles move offshore and occupy drift convergence zones. Because green sea turtles are herbivores and feed primarily on sea grasses and algae, adults are found in nearshore areas. Juveniles are found more offshore rafting in algae and leading a pelagic existence until adulthood. At about 8 to 10 inches, turtles leave the pelagic stage and enter benthic feeding grounds. They forage most commonly in seagrass beds although they are also found over reefs and rocky bottoms. Important feeding areas for green turtles in Florida include the seagrass beds near Crystal River, Cedar Key, and Homossassa Bay (Figure 3-4) (NOAA 1985; NRC 1990; USFWS and NMFS 1991; USFWS 2009a).

This species is known to forage in nearshore habitats, including seagrass beds, year around within the Gulf of Mexico. Greens are expected to occur within the vicinity of the WTA throughout the year; however, the important feeding grounds are located south of the WTA (NMFS and USFWS 2007c). The WTA overlaps with the Big Bend Seagrass Aquatic Preserve along the northern border and southeastern point, which are potential foraging grounds for greens (Figure 3-4). As shown in Table 3-4, between 1998 and 2007, 20 green sea turtles were reported stranded within NMFS Statistical Zone 7 (STSSN 2009). The distribution and locations of the strandings from 1986-2004 are shown in Figure 3-5.

Hawksbill Sea Turtle. Hawksbill turtles are highly migratory and are found in the Caribbean Sea in addition to tropical and subtropical regions of the Atlantic, Pacific, and Indian Oceans. In general hawksbill turtles nest in low densities on insular and mainland sandy beaches; the largest nesting population is within the Caribbean and accounts for approximately 20-30% of the world's population; nesting within the continental U.S. is rare with scattered nests having been observed mostly in southeastern Florida. Current threats include human exploitation for tortoiseshell, beachfront lighting disorienting hatchlings, degradation of foraging and nesting habitat, fisheries bycatch, marine pollution and debris, and watercraft strikes (NRC 1990; NMFS and USFWS 2007d, USFWS 2009b).

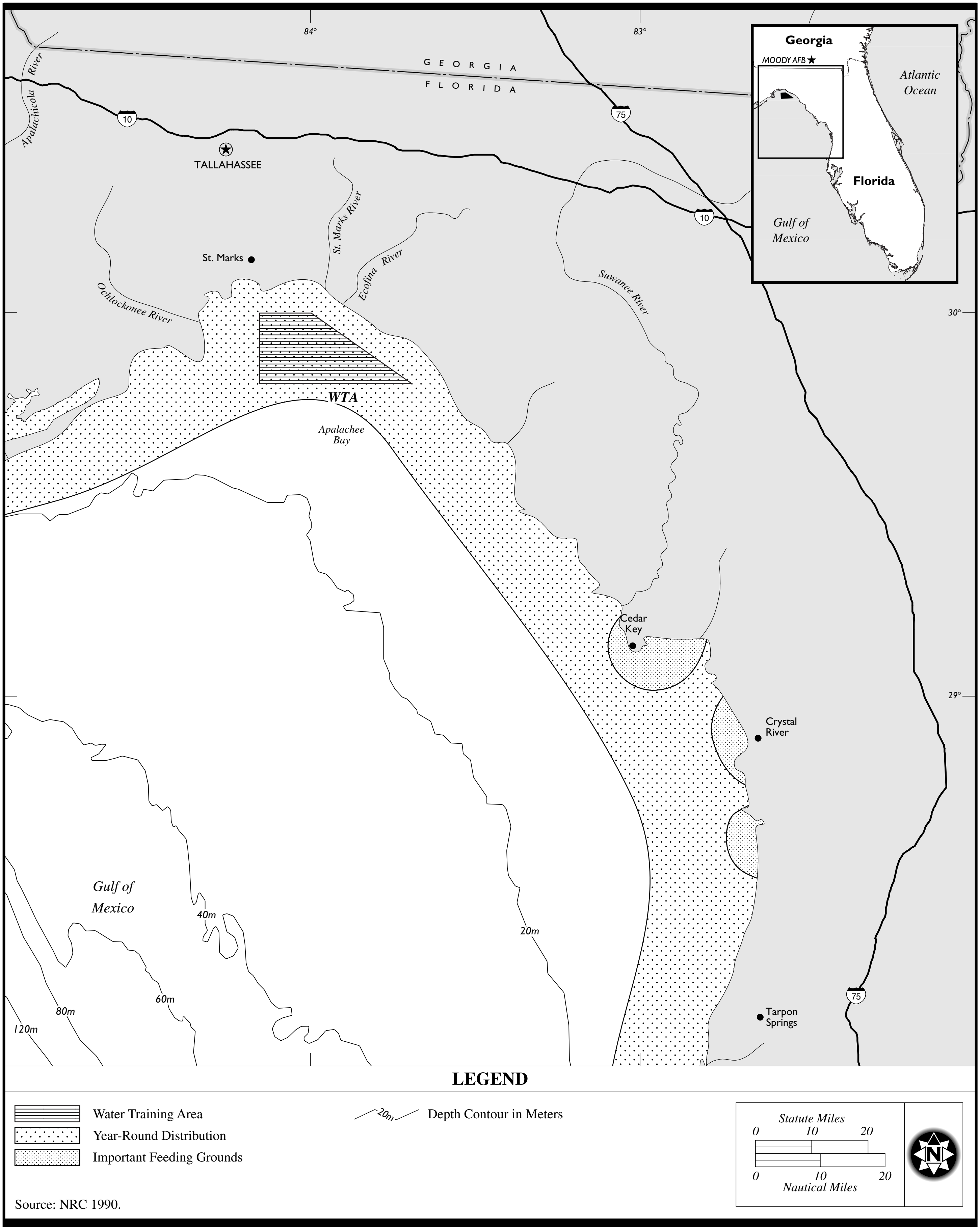

Figure 3-4
Distribution of Green Sea Turtles along Coastal Northwest Florida

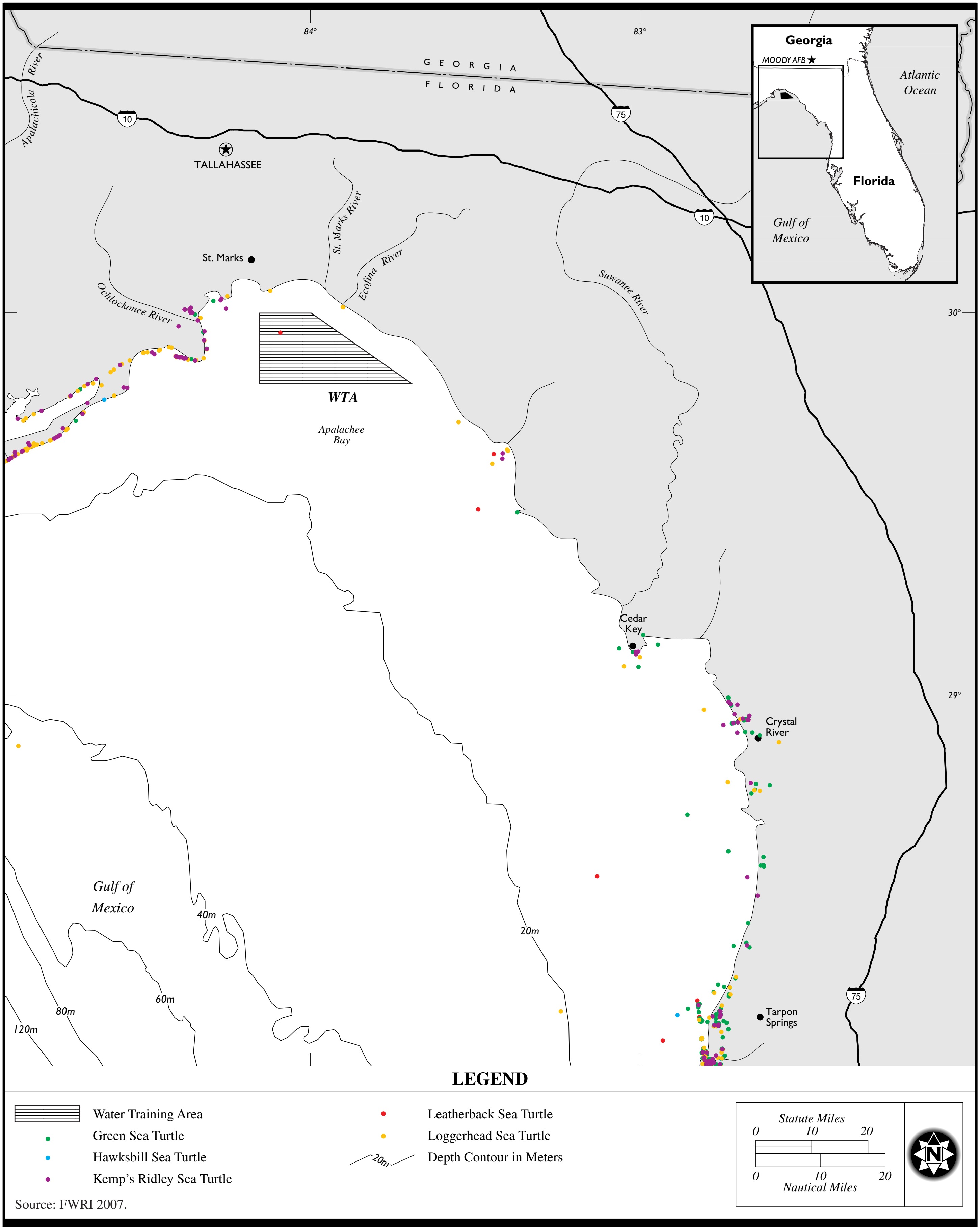

Figure 3-5
Strandings of Sea Turtles along Coastal Northwest Florida (1986-2004)

Table 3-4. Sea Turtle Strandings within NMFS Zone 7 (1998-2007)

Year	*Species*				
	Green	*Hawksbill*	*Kemp's Ridley*	*Leatherback*	*Loggerhead*
1998	1	0	1	0	9
1999	1	0	4	1	6
2000	3	0	4	0	9
2001	0	0	9	0	8
2002	4	0	7	1	5
2003	2	1	2	0	4
2004	2	0	5	0	9
2005*	1	0	14	0	19
2006*	4	0	6	0	16
2007*	2	1	1	2	15
Total	**20**	**2**	**53**	**4**	**100**

Source: STSSN 2009.
Note: *Reports for 2005, 2006, and 2007 are preliminary and are subject to change (STSSN 2009).

Because of their tropical and reef-oriented distribution, hawksbills are infrequent in the northern Gulf of Mexico (Minerals Management Service 1991; NMFS and USFWS 2007d). From 1998 to 2007, only two stranded Hawksbill sea turtles were reported from Statistical Area 7 (see Table 3-4) (STSSN 2009). The occurrence of hawksbill turtles in the WTA would be extremely rare.

Kemp's Ridley Sea Turtle. The Kemp's ridley is the most endangered of the sea turtles. The population declined sharply between the 1940s and 1980s, and it was only conservation efforts initiated in the 1980s that halted the downward trend. The historic distribution of the Kemp's ridley sea turtle included the Gulf coasts of Mexico and the U.S., and the Atlantic coast of North America. Kemp's ridley sea turtles are shallow water, benthic feeders often found foraging in embayments. They nest in large aggregations called *arribadas*, which are speculated to enhance survival of eggs due to "safety in numbers". The majority of nesting activities occur in one isolated area of Mexico, with limited nesting occurrences reported in Texas, and no nesting occurrences have been recorded on the Atlantic coast of the U.S. Kemp's ridley populations have declined more than any other sea turtle species and the species was listed as endangered in 1970 (NRC 1990; NMFS and USFWS 1992b, 2007b; USFWS 2009c).

The nesting season extends from April to July with eggs taking about 50 days to hatch. Newly hatched turtles are epipelagic and typically associate themselves with Sargassum weed and other flotsam and drift for an indeterminate period of time (NMFS and USFWS 1992b, 2007b). Although some young may be carried up the U.S. East Coast via the Florida current and the Gulf Stream (Carr 1980; Collard 1987), adults are found almost entirely in the Gulf of Mexico. In the northern Gulf of Mexico, juveniles and subadults are most common in shallow coastal waters of the western Gulf, but they occur throughout the Gulf, including Florida. In the eastern Gulf, the northwest coast of Florida from just north of Tampa Bay to Cape St. George is considered a major year-round nursery area (Figure 3-6). Juveniles, sub-adults, and adults feed on various species of crabs and other invertebrates. In the northern Gulf of Mexico, the blue crab is a common food (NOAA 1985; NRC 1990; NMFS and USFWS 1992b, 2007b).

From 1998 to 2007, 53 Kemp's ridleys stranded within NFMS Regional Zone 7 with the greatest number of strandings (14) in 2005 and only 1 stranding in 2007 (see Table 3-4) (STSSN 2009). Due to their occurrence throughout the Gulf of Mexico and the presence of a year-round nursery in the area, Kemp's ridley sea turtles may be encountered in small numbers within the WTA.

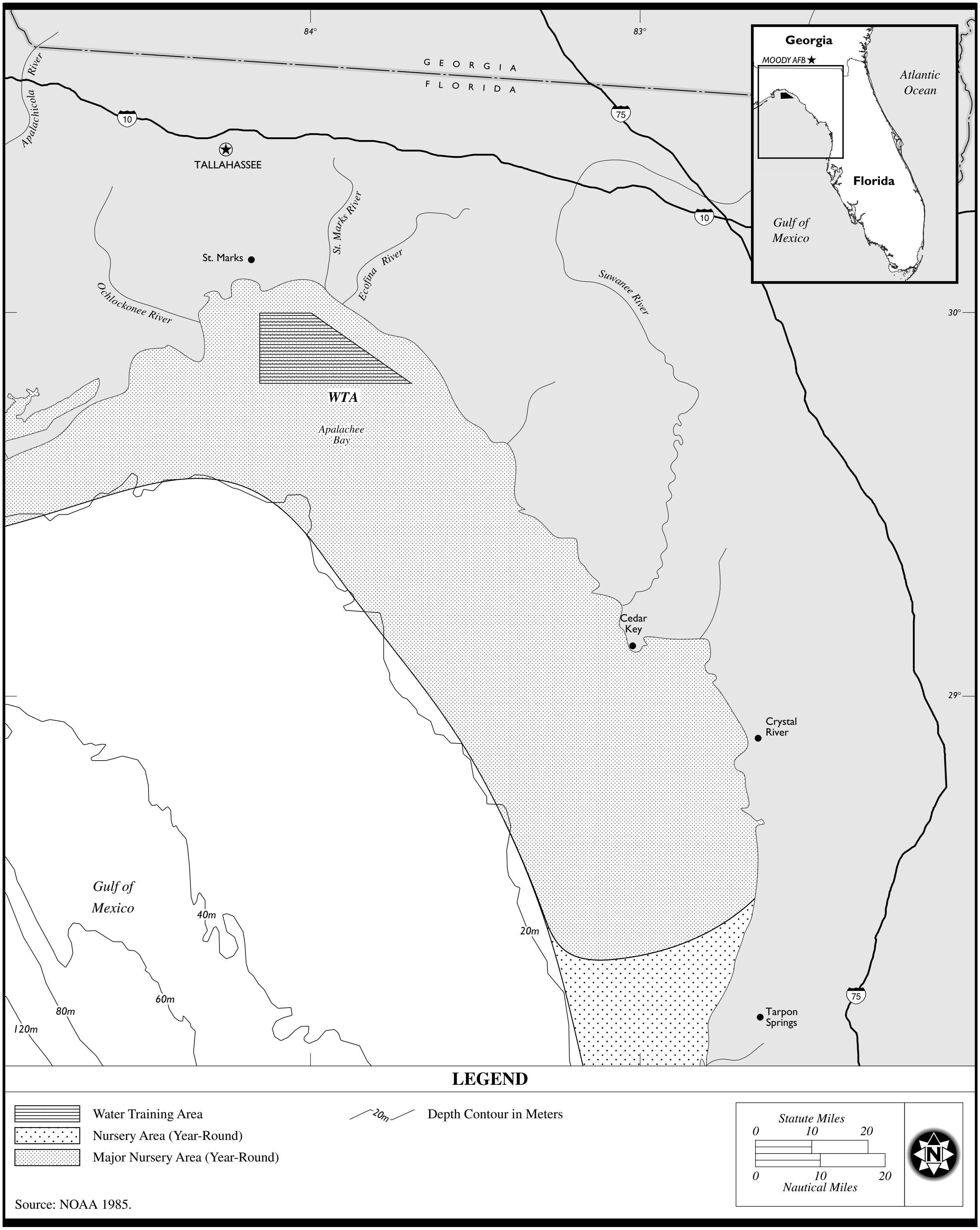

Figure 3-6
Distribution of Kemp's Ridley Sea Turtles along Coastal Northwest Florida

Leatherback Sea Turtle. The leatherback is the largest of all sea turtles, attaining a carapace length of 5-6 ft and weighing up to 1,100 pounds. Leatherback sea turtles are broadly distributed throughout the Atlantic, Pacific, Caribbean and Gulf of Mexico, with a relatively high tolerance for extreme temperatures. This high temperature tolerance allows for long migrations through areas with varying oceanographic conditions. In addition to extreme thermal tolerances, leatherbacks are known to be deep divers (over 300 ft), and spend a large amount of time offshore in deeper waters. The hypothesized reason for the offshore preference is that leatherback sea turtles feed on jellyfish and other pelagic animals that are found most commonly offshore. Although generally a deep-diving pelagic species, seasonal movement into coastal waters to feed on large jellyfish that are associated with rivers and frontal boundaries has been documented (Eckert et al. 1989; NRC 1990; NMFS and USFWS 1992a; Eckert 1995).

Leatherback sea turtles nest from March through July, with an incubation period of 55-75 days. The majority of nesting occurs along the coasts of Mexico, but nesting also occurs at various Caribbean locations and the Atlantic coast of Florida. The leatherback sea turtle was listed as endangered in 1970. The decline in numbers of leatherback sea turtles is mainly attributed to nesting habitat degradation, illegal harvest of adults and eggs, incidental take, and pollution (NMFS and USFWS 1992a, 2007e; USFWS 2009e).

Leatherback turtles may be encountered within the WTA region; however, their occurrence is expected to be rare due to their preference for deeper pelagic waters. From 1998 thru 2007, only four stranded leatherback sea turtles have been reported within Statistical Area 7 (see Table 3-4) (STSSN 2009).

Loggerhead Sea Turtle. Loggerhead sea turtles have a wide distribution including the Atlantic, Pacific and Indian oceans. Loggerheads nest in the temperate and subtropical regions of their geographic distribution, and in the U.S. the most common nesting areas include the coastal region between North Carolina and Florida, including the Florida Gulf coast. Minor nesting occurs along the Florida Panhandle to the west of the WTA (Figure 3-7). Their absence in this area coincides with the presence of mud flats and marshes and the absence of sandy beaches. In the southeastern U.S., the nesting season for loggerheads is late May through early September. Hatchlings often spend several months in nursery areas, until ocean currents move the young turtles further offshore to grow. A pelagic existence can last between 7 and 12 years for juveniles before migration back to nearshore coastal areas to mature until adulthood. Adult loggerheads forage for benthic invertebrates associated with hard bottoms predominately in areas throughout the relatively shallow continental shelf waters of the U.S., Bahamas, Cuba, and the Yucatán Peninsula, Mexico. Adults migrate between foraging habitats and beaches for nesting along the continental shelf or long distances across oceanic waters (NRC 1990; NMFS and USFWS 1993, 2007a; USFWS 2009d).

The loggerhead turtle was listed as threatened in 1978. Threats to the species include numerous human activities that impact nesting areas and can lead to adult mortality. Examples for loss of nesting habitat include alterations of beaches, such as beach armoring to prevent erosion for beachfront development or beach nourishment to replace sand lost to natural erosion. Adult mortality can be caused by a number of factors, including, but certainly not limited to coastal development that destroys foraging habitat and numerous types of fisheries that involve bycatch.

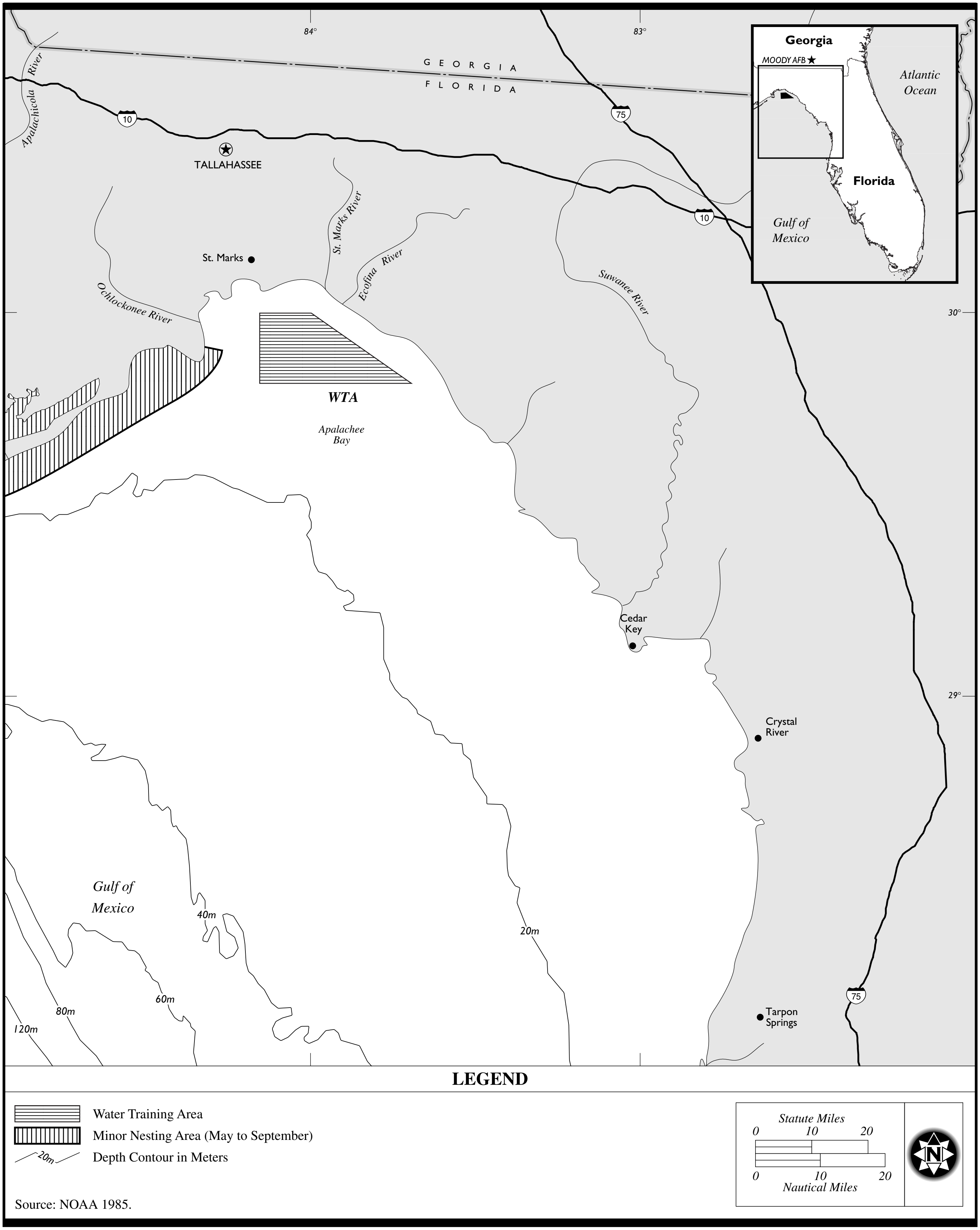

Figure 3-7
Distribution of Loggerhead Sea Turtles along Coastal Northwest Florida

Although populations appear to be rebounding in some areas of their distribution, this is not the case in all areas. Data collected by the USFWS indicated a steady and steep decline in the number of nests sighted in Florida from 1998-2007. A review conducted by the NMFS in 2007 recommended this species remain listed as threatened until a longer time series of data is available (NRC 1990; NMFS and USFWS 1993, 2007a; USFWS 2009d).

The nearshore areas of the action area may provide suitable habitat for pelagic juveniles and feeding adults. In the vicinity of the WTA, loggerheads generally migrate into the area around May and remain until August (USFWS 2009d). As shown in Table 3-4, of the species of sea turtles that may strand within the vicinity of the WTA, loggerheads had the greatest number of strandings (100) from 1998 to 2007. The number of stranded loggerheads dramatically increased in 2005, 2006, and 2007 from an average of 7 strandings per year from 1998 to 2004, to 19, 16, and 15, respectively (STSSN 2009).

Marine Mammals

Marine mammals known to occur in the Gulf of Mexico include members of three distinct taxa: *Cetecea*, which includes whales and dolphins; *Pinnipedia*, which includes seals and sea lions, and *Sirenia*, which includes manatees and dugongs. At least 28 species of cetaceans (21 species of toothed whales [odontocetes] and 7 species of baleen whales [mysticetes]), 1 introduced pinniped species (California sea lion [*Zalophus californianus*]), and 1 sirenian species (West Indian manatee [*Trichechus manatus*]) have been identified from sightings or strandings in the Gulf of Mexico.

All marine mammals are protected by the Marine Mammal Protection Act (MMPA) (16 United States Code [USC] §1431 *et seq*.). Many marine mammal species are also listed as endangered or threatened and protected under the ESA (16 USC §1531). The West Indian manatee is listed as an endangered species under the ESA and is also protected under the Florida Manatee Sanctuary Act of 1978. Although several species of cetaceans occurring in the Gulf of Mexico are listed as endangered under the ESA, none of these species are known to occur in the WTA.

Only two species of marine mammals are known to occur regularly within WTA: the bottlenose dolphin and the West Indian manatee. With the exception of the Atlantic spotted dolphin (*Stenella frontalis*), which is not expected to frequent the WTA, all other cetacean species in the Gulf of Mexico occur mainly in deeper, offshore waters (Fertl et al. 1998). The low species diversity is most likely due to the lack of prey species within the WTA; as described above, the WTA consists of sandy, flat bottom with no known coral reefs or major rock outcrops to provide suitable fish habitat. In addition, the WTA is located over the continental shelf in relatively shallow water. Additional information on the occurrence of bottlenose dolphins and manatees within the WTA is provided below.

Bottlenose Dolphin. Bottlenose dolphins are opportunistic feeders that forage regularly near the sea bottom on a wide variety of fish and invertebrates. Two distinct types of bottlenose dolphins have been identified for the Gulf of Mexico: a coastal form and an offshore form. The latter are reported to be larger and darker in color than bottlenose dolphins that inhabit shallow coastal waters, including WTA. As required by the MMPA, NMFS is responsible for preparing stock assessment reports for each stock of marine mammal that occurs in U.S. waters. For management purposes within the Gulf of Mexico, NMFS has subdivided the coastal and offshore forms of bottlenose dolphins into separate geographic stocks that include: a continental edge and continental slope stock; an outer continental shelf stock; three coastal stocks (western, northern, and eastern); and numerous discrete bay, sound, and estuarine stocks. Stocks may overlap in some areas and the coastal forms may be genetically indistinguishable from each other. Bottlenose dolphins most likely to be found within WTA include members of the Apalachee Bay stock, although members of the eastern Gulf of Mexico coastal stock may occasionally be found in this area (NMFS 1997b).

Coastal stocks of bottlenose dolphins are typically found in smaller groups (i.e., less than 20 individuals) than the stocks that inhabit deeper offshore waters. In addition to smaller group sizes, the population levels of bottlenose dolphins in coastal areas fluctuate, possibly due to the seasonal influx of migrants. The abundance and distribution of both "residents" (individuals that stay in an area year-round) and "transients" (individuals that travel along the coastline) contribute to the varying population levels of a particular coastal area. The movements of both resident and transient populations are most likely related to fish movements which, in turn, are probably due to fluctuating water temperatures (Fertl et al. 1998).

Based on the most current stock assessment report the Apalachee Bay coastal bottlenose dolphin stock has a population size of 491 (Waring et al. 2007). Although photo-identification and radiotracking studies of other Gulf of Mexico coastal stocks indicate that some individuals remain in the same general area throughout the year, this situation has not been confirmed for the resident bottlenose dolphin stocks that occur in the Florida panhandle region. However, although movement patterns are not currently known, it is reasonable to assume that there is some seasonal difference in bottlenose abundance in the Apalachee Bay area. Therefore, the number of bottlenose dolphins occurring within WTA at any one time can range from 0 to approximately 500, the latter assuming that the entire Apalachee Bay stock is present as well as some transients from other Gulf of Mexico coastal stocks. Since coastal stocks typically occur in small groups, it is more likely that, at any one time, fewer than 20 individuals may be present in WTA.

West Indian Manatee. Manatees are herbivores that feed opportunistically on a wide variety of (listed in order of preference) submerged, emergent, and floating vegetation including rooted seagrasses, emergent vascular plants, benthic algae, and floating plants (USFWS 2001, 2007).

The general manatee distribution pattern is characterized by typically larger numbers of animals concentrating at warm water sites during the winter, and dispersing in smaller groups during the summer. When water temperatures drop below about 70 to 72^{O} F, manatees migrate to southern Florida or form large aggregations near warm waters such as natural springs and power plant outfalls. During warmer summer months they disperse, appearing to choose areas based on an adequate food supply, water depth, and proximity to fresh water. Travel thus occurs seasonally as manatees move between winter gathering sites and summer dispersal areas. Repeated sightings of individuals show that many manatees travel over 100 miles to return to preferred summer and winter grounds (Florida Power and Light [FPL] 1999; USFWS 2001, 2007).

Throughout their range manatees inhabit both salt and freshwater areas at depths of 5 to 20 ft. Manatees tend to travel in waters 10 to 16 ft deep along the coast and are rarely sighted in areas deeper than 20 ft. They may be encountered in canals, rivers, estuarine habitats, saltwater bays, and on occasion have been observed as much as 3.7 miles offshore of the Florida Gulf coast (Air Force 1999; USFWS 2001, 2007). However, in the Gulf of Mexico manatees are rarely observed farther than 0.6 mile from the mouth of a river (FPL 1999). Shallow grass beds with ready access to deep channels are preferred feeding areas. Manatees often use secluded canals, creeks, embayments, and lagoons, particularly near the mouths of coastal rivers and sloughs, for feeding, resting, mating, and calving (Reeves et al. 1992).

During the winter, the U.S. manatee population is confined to the coastal waters of the southern half of peninsular Florida and to natural springs and warm water outfalls farther north. On the west coast of Florida, the most important manatee wintering areas in the northern part of their range are the headwaters of the Crystal and Homosassa rivers in Citrus County. However, most of the manatee population moves further south in the winter (USFWS 2001, 2007).

During summer months, manatees are observed in small groups throughout southern Florida, occurring in coastal waters, estuaries, bays, and rivers of both the Gulf and Atlantic coasts. Although manatees are sighted in the Panhandle area in the summer, the majority of the western Florida population typically occurs south of the Suwannee River (FPL 1999; USFWS 2001, 2007).

The USFWS conducted regular aerial surveys in this region within 1 mile from shore during the 1990s and consider the likelihood of encountering a manatee further offshore to be low (Air Force 1999). Aerial surveys have not been conducted within the Big Bend area since the mid to late 1990s. Up until the past few years manatees were only in the area seasonally (Apr-Nov), but recently approximately 10-12 manatees have been overwintering in the Wakulla Springs area, northwest of the St. Marks National Wildlife Refuge (NWR). Most manatees stay along the shoreline and feed within 3-5 ft of water. Rarely does a manatee venture further offshore, particularly 4 nm from shore to the WTA (FFWCC 2009).

The majority (approximately 85%) of the waters beneath the WTA are at depths greater than 18 ft; only 15% of the WTA occurs in water 12-18 ft deep. During the winter months, the manatee population within the waters adjacent to the St. Mark's Power Plant, near the St. Marks NWR, usually consists of less than 10 individuals. Up to 30 manatees can be expected in the waters adjacent to St. Marks NWR during the summer months (Air Force 1999). The WTA is located approximately 4 miles offshore and south of the St. Marks NWR. Given the WTA's distance from shore, the absence of sea grass beds in this offshore area, and its water depth (i.e., the majority of WTA is greater than 18 ft deep), manatees are expected to be very rare in the WTA.

3.2.1 Environmental Consequences

This section analyzes the potential for impacts to marine biological resources from implementation of the Proposed Action. The primary marine biological resource issue is the potential for marine marker ingestion by marine species of concern, particularly ESA-listed sea turtles.

3.2.1.1 Marine Flora

The use of marine location markers (i.e., flares, lightsticks, and sea dye packs) during PR training operations in the WTA would result in the addition of these items or their by-products into the marine environment.

The MK6 flare is designed to completely incinerate its wooden housing and internal contents. Small amounts of uncombusted wood may float and wash ashore but would not have any impacts on marine flora in the WTA. The smaller MK25 flare is composed of an aluminum housing containing the flare materials. Upon combustion of the internal flare materials, the aluminum housing would sink. Seagrass beds and other marine flora are not extensive in the WTA, and it is unlikely that the aluminum housing would directly impact seagrass beds in the area. However, if an aluminum housing were to settle on a seagrass bed, impacts to marine flora would not be significant since the components of the housing are not toxic.

Due to their plastic composition, lightsticks and expended sea dye packs would not directly impact marine flora in the WTA. The contents of either would be dispersed and diluted quickly in the waters of the Gulf as a result of natural mixing due to wind, wave, and current action.

Due to the lack of extensive seagrass beds and other marine flora in the WTA, the dispersed nature of proposed training operations within the WTA, and the rapid dispersion and dilution of the by-products of any of the marine location markers, impacts to marine flora would not be significant.

3.2.1.2 Marine Fauna

Invertebrates

As discussed previously, the use of marine location markers (i.e., flares, lightsticks, and sea dye packs) during PR training operations in the WTA would result in the addition of these items or their by-products into the marine environment. Due to the dispersed nature of training operations within the WTA and the rapid dispersion and dilution of the by-products of any of the marine location markers, impacts to marine invertebrates would not be significant.

Fish

As discussed previously, the use of marine location markers (i.e., flares, lightsticks, and sea dye packs) during search and rescue training operations in the WTA would result in the addition of these items or their by-products into the marine environment. Due to the dispersed nature of training operations within the WTA and the rapid dispersion and dilution of the by-products of any of the marine location markers, impacts to marine fish would not be significant.

Special-Status Species

Gulf Sturgeon and Smalltooth Sawfish. Both of these fish species are not expected to occur within the WTA as they primarily frequent shallow, nearshore waters. Both are also bottom feeders and are unlikely to come into contact with the floating debris associated with the Proposed Action. Although expended flare materials are expected to sink to the bottom, it is very unlikely that either Gulf sturgeon or smalltooth sawfish would attempt to ingest the casings if encountered. Therefore, the proposed PR training activities are discountable and not likely to adversely affect Gulf sturgeon or smalltooth sawfish, and there would be no significant impacts to either species with implementation of the Proposed Action. As a result of the ESA section 7 consultation process, NMFS concurred with these findings in their BO (NMFS 2010; refer to Appendix B for the complete BO).

Sea Turtles. As effects in the marine environment are similar for the five sea turtle species addressed in this EA, the analysis will be combined for all sea turtle species potentially found in the WTA.

As part of the terms and conditions of the 1999 BO (NMFS 1999), NMFS required the Air Force to contact the Florida coordinator of the STSSN annually and obtain the percentage of sea turtles that were necropsied during the year that had ingested plastic and to ascertain if the ingested plastic had originated from PR training materials. To date, of the 972 necropsied sea turtles, none of the plastic found within the 28 sea turtles that had ingested plastic was determined to be from PR training materials (i.e., lightsticks or sea dye packs) (Air Force 2001, 2002, 2003, 2004, 2005, 2006b, 2007, 2008, 2009).

Table 5-3. Percentage of Necropsied Stranded Sea Turtles with Ingested Plastic (2000-2008)

Year	*Total # Sea Turtles Necropsied*	*# Sea Turtles with Ingested Plastic*
2000	94	3 (3.2%)
2001	80	4 (5%)
2002	119	9 (7.6%)
2003	186	4 (2.2%)
2004	129	3 (2.3%)
2005	111	0
2006	121	4 (3.3%)
2007	36	1 (2.8%)
2008	96	0

Sources: Air Force 2001, 2002, 2003, 2004, 2005, 2006b, 2007, 2008, 2009.

The ingestion of man-made debris constitutes a potential threat to sea turtles that occur in the ROI (Balazs 1985; Carr 1987). Plastic can lodge in an animal's digestive tract causing reduced nutrient absorption, intestinal damage, releases of toxic chemicals, or blockages, which cause starvation (Balazs 1985). Researchers have reported high levels of debris ingestion in all species of stranded sea turtles along the Gulf coast. In studies along the Texas Gulf coast, ingestion rates were highest in loggerhead (51% and 26%) and green sea turtle (47% and 32%); leatherback, hawksbill, and Kemp's ridley had lower ingestion rates (24, 14, and 4%, respectively) (Plotkin and Amos 1988, 1990; Stanley et al. 1988; NRC 1990; Plotkin 1993).

Kemp's ridley and loggerhead would likely be the most abundant sea turtles in the general area, and the presence of green sea turtles would not be unexpected given the proximity of seagrass beds in the nearshore areas adjacent to the WTA. However, Kemp's ridleys are most common in the nearshore region, being more frequently observed inside the bays and in estuarine habitats than in offshore areas like the WTA.

While some green turtles may be encountered in the Apalachee Bay area, the coastal zone south of Cedar Key is a more important foraging area for this species. Leatherback sea turtles are pelagic and feed at the surface or in the water column on jellyfish. However, being an offshore pelagic species, leatherback sea turtles would be rare in nearshore waters of the WTA.

Loggerheads are expected to be the most common sea turtle at the depths occurring in the WTA. Further, it has been documented that loggerheads have a high rate of debris ingestion with plastics being the dominant debris type consumed. Should a marine marker-sea turtle interaction occur, the affected species would most likely be the loggerhead.

A total of 14,000 lightsticks, 2,550 flares, and 1,450 sea dye packs could potentially be dropped annually within the WTA. Of the three types of marine markers, flares would be the least likely to be ingested by sea turtles because of their basic construction. Most instances of sea turtles ingesting foreign objects involve soft-plastic derivatives such as plastic bags, plastic sheeting, balloons, and monofilament fishing line that might be confused with jellyfish or other prey (NRC 1990). The MK6 flare is designed to completely incinerate its wooden housing and internal contents. Small amounts of uncombusted wood may float and wash ashore. The smaller MK25 flare is composed of an aluminum housing containing the flare materials. Upon combustion of the internal flare materials, the aluminum housing would sink. The expended remains of either flare would not be an attractant to a feeding or swimming sea turtle. In addition, the size of the expended aluminum casing of the MK25 would preclude any possibility of ingestion by a bottom foraging sea turtle.

The likelihood that either marker would be consumed is low, however, because the expected densities of sea turtles, lightsticks, and expended dye packs in the project area would be low. The dispersal of buoyant lightsticks would be wind-driven and therefore variable. On average, net dispersal would be expected to be from west to east during winter months and from east to west during summer. Lightsticks, being highly buoyant, could be transported out of the study area by prevailing currents, while others could find their way into coastal seagrass beds, creating more of an aesthetic problem as opposed to a biological hazard. While lightsticks could drift into these coastal habitats, their density would be low following the dispersal occurring in the unknown time interval between the 'point source' release and their stranding on the coast. In addition, the size, shape, and composition of a lightstick make it unlikely that a sea turtle would be able to ingest a lightstick. Sea turtles are known to investigate or 'mouth' potential food items and if a lightstick is encountered a turtle may attempt to consume it. However, there have been no records of sea turtles having ingested lightsticks (Plotkin and Amos 1988, 1990; Stanley et al. 1988; NRC 1990; Plotkin 1993).

Because of its similarity to the types of plastics most often consumed by sea turtles, expended sea dye packs would be the more likely of the two marine markers to be consumed if encountered. Over the longer term, neutrally buoyant expended sea dye packs would be more of a concern. If dye packs submerge, they would be less likely to be purged from the marine system. Some could be transported out of the study area by prevailing currents, while others could find their way into coastal seagrass beds. If expended dye packs are not transported out of Apalachee Bay in substantial numbers, the cumulative effect of adding 1,450 sea dye packets per year to the Gulf would increase the probability of a sea turtle encounter. There exists a remote, yet real, possibility that sea turtles in the project area could encounter and consume expended sea dye packs released into the WTA during training operations. The encounter may be detrimental or even fatal. Use of sea dye packs and lightsticks may thus result in the incidental take of threatened and endangered sea turtles. Incidental take is defined as take that results from, but is not the purpose of, carrying out an otherwise lawful activity. To minimize chances of such take, formal ESA consultation with NMFS was completed and an incidental take permit was obtained that addresses use of the proposed WTA. The resulting BO from NMFS concurred with the Air Force's findings that the effects of the Proposed Action and potential cumulative effects are not likely to jeopardize the continued existence of loggerhead, Kemp's ridley, green, hawksbill, or leatherback sea turtles in the Atlantic Basin (including the Gulf of Mexico) (NMFS 2010; refer to Appendix B). The terms and conditions, and consultation-derived reasonable and prudent measures within the incidental take statement will be implemented. These include: (1) the Air Force shall continue to develop and improve their program aimed at helping to understand the dynamics and effects of marine debris ingestion by sea turtles and to decrease the interactions between sea turtles and marine debris, (2) to the maximum extent practicable, the Air Force shall decrease the amount of debris discarded due to the Proposed Action and monitor the effects of marine debris associated with the Proposed Action, and (3) the Air Force shall monitor the effects of the project on sea turtles. With implementation of these reasonable and prudent measures, impacts to sea turtles would not be significant.

3.2.1.3 Marine Mammals

As potential acoustic impacts to marine mammals from PR training operations were previously assessed in the 1999 EA for the establishment of the WTA (Air Force 1999), and the proposed continued PR aircraft operations would be the same in duration, location, and frequency, a discussion of potential acoustic impacts is not presented in this EA. The previous analysis is still valid and there would be no significant impacts to marine mammals from aircraft operations and the associated noise with implementation of the Proposed Action. The potential impacts analyzed in this EA address potential exposure of marine mammals to lightstick and flare illumination devices, and to the components of sea dye markers dispensed in plastic bags.

Impacts of Exposure to Lightsticks

Lightsticks are small, plastic chemiluminescent devices that would be used as portable light sources during operations after dark in the WTA. A total of 14,000 lightsticks would be dropped annually within the WTA. As described in Section 3.1 (Waste Management), Navy, Air Force, and Coast Guard groups operating within the Gulf use lightsticks during some of their training and rescue operations. Commercial fishermen also use lightsticks to mark their longlines, but these operations occur on the shelf edge or south of the study area, and are conducted in areas where water depths are greater than 300 ft.

Lightsticks contain two solutions which, when mixed together by breaking two small glass ampoules within the plastic casing, produce a light with little or no heat by-product. The constituents of these solutions do not meet the criteria for a listed hazardous waste, although hydrogen peroxide, one of the constituents, is an irritant to mammalian skin and mucous membranes at high concentrations. It is unlikely that contact with the spent lightsticks would result in exposure to the chemical contents as the housing is a tough, pliable plastic. If the casing were broken, either through degradation over time or physical destruction (such as a bottlenose dolphin or manatee chewing through the casing during play or feeding), the enclosed small quantity of chemicals would disperse rapidly. The compounds within the spent lightsticks are relatively inert, and those (such as hydrogen peroxide) within unspent lightsticks are not present in sufficient quantities to cause more than short-term, localized irritation to mucous membranes of the mouth or eyes.

While there might be some risk of injury to marine mammals if they ingested the sharp plastic or glass shards of a broken lightstick, this would be an unlikely event due to the large area over which lightsticks are released. There are no records of dolphin or manatee deaths resulting from ingestion of lightsticks and ingestion of foreign objects by cetaceans in the wild does not appear to be a common occurrence (Tarpley and Marwitz 1993).

Beck and Barros (1991) examined 439 manatee carcasses salvaged from 1978 to 1986. Only 63 (14%) had debris in their gastrointestinal tracts and they speculated that 4 (0.9%) might have died as a result of debris ingestion. Fishing line was by far the most common type of man-made debris in the gastrointestinal tracts, with plastic bags and a wide variety of other items also recovered. Vessel collisions remain the greatest identifiable cause of manatee mortality in Florida (USFWS 2007).

Impacts of Exposure to Flares and Sea Dye Markers

Approximately 2,550 flares would be used annually in the WTA during PR training activities. No non-military uses of flares are anticipated in the area, although commercial and recreational vessel operators might use flares for detection during an emergency. Navy, Air Force, and Coast Guard groups may occasionally use flares during training and rescue operations in the Gulf. Toxicity is not a concern with flares because the primary material in flares, magnesium, is not highly toxic (Air Force 1997). There have been no documented reports of wildlife consuming flare materials, and it is unlikely that bottlenose dolphins or manatees would ingest these materials. The probability of injury from falling dud flares and debris would be extremely remote. Although impulse cartridges and squibs used in some flares contain chromium and lead, a screening health risk assessment concluded that they do not present a significant health risk in the environment (Air Force 1997) in the quantities that would be used in the WTA.

Bottlenose dolphins or manatees could ingest flare debris with food. This scenario is unlikely, and any effects of such ingestion are likely to be short-term and unlikely to cause serious internal damage to digestive organs. Contact with flare debris is unlikely to cause injury to skin or eyes because contact would not be prolonged and the materials contained in spent flares are biologically inert. Flare debris would be encountered in very small quantities and, aside from a small amount of wood debris (i.e., from the MK6), would sink in oceanic waters (particularly the aluminum housing of the MK25). The impacts of flares on bottlenose dolphins and manatees are considered not significant.

During PR training operations in the WTA, the rescue squadrons would deploy plastic bags of brightly-colored fluorescein dye to provide visual reference during marine operations. The sea dye is contained in a plastic bag, approximately the length and width of a piece of letter-format paper, that would be dropped from an aircraft at an altitude greater than 50 ft. Upon impact the bags burst and the dye is dispensed into the water. At dilute concentrations the dye itself is relatively inert. A bowhead whale (*Balaena mysticetus*) calf has been observed orienting to and playing for an extended period (22 minutes) within an area colored by fluorescein dye (Würsig et al. 1985) so for this animal the dilute dye did not appear to be particularly noxious.

The plastic bags associated with dye markers may sink to the bottom or remain on the surface of the water and drift toward shore, causing a potential ingestion hazard for dolphins and manatees. In a study of manatee carcasses recovered along the Florida coast, Beck and Barros (1991) reported that only 0.9% (4 animals) might have died as a result of debris ingestion. Only a small proportion of the debris found in the gastrointestinal tracts was plastic fragments or plastic bags. Ingestion of foreign objects, including plastic bags, by cetaceans in the Gulf of Mexico does not appear to be a common occurrence based on analysis of the stomach contents of stranded animals (Tarpley and Marwitz 1993).

It is possible that the plastic bags used to dispense sea dye might pose a potential ingestion hazard for bottlenose dolphins and manatees. However, the evidence to date does not suggest that the risk to these marine mammals from exposure to these bags is high. These sea dye bags probably represent a small fraction of the total man-made plastic debris to which these two species have been and will be exposed. The impacts of sea dye bags on bottlenose dolphins and manatees would not be significant.

CHAPTER 4
CUMULATIVE EFFECTS

This section provides: 1) a definition of cumulative effects, 2) a description of past, present, and reasonably foreseeable actions relevant to cumulative effects, 3) an assessment of the nature of interactions of the proposed action with other actions, and 4) an evaluation of cumulative effects potentially resulting from these interactions.

4.1 DEFINITION OF CUMULATIVE EFFECTS

CEQ regulations stipulate that the cumulative effects analysis within an EA should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR 1508.7). CEQ guidance in *Considering Cumulative Effects* affirms this requirement, stating that the first steps in assessing cumulative effects involve defining the scope of the other actions and their interrelationship with the proposed action (CEQ 1997). The scope must consider geographic and temporal overlaps among the proposed action and other actions. It must also evaluate the nature of interactions among these actions.

Cumulative effects are most likely to arise when a relationship or synergism exists between a proposed action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in close proximity to the proposed action would be expected to have more potential for a relationship than those more geographically separated. Similarly, actions that coincide, even partially, in time would tend to offer a higher potential for cumulative effects. To identify cumulative effects the analysis needs to address three fundamental questions:

1. Does a relationship exist such that affected resource areas of the proposed action might interact with the affected resource areas of past, present, or reasonably foreseeable actions?
2. If one or more of the affected resource areas of the proposed action and another action could be expected to interact, would the proposed action affect or be affected by impacts of the other action?
3. If such a relationship exists, then does an assessment reveal any potentially significant impacts not identified when the proposed action is considered alone?

4.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

The scope of the cumulative effects analysis involves both the geographic extent of the effects and the time frame in which the effects could be expected to occur. For this EA, the ROI delimits the geographic extent of the cumulative effects analysis. The ROI includes the horizontal and vertical (airspace) boundaries of the WTA used for training. Actions occurring outside the ROI are not considered for cumulative effects analysis. The time frame for cumulative effects centers on the timing of the proposed action. For the proposed action, the time frame starts in December 2010 and would continue into the foreseeable future.

Another factor influencing the scope of cumulative effects analysis involves identifying other actions to consider. Beyond determining that the geographic scope and time frame for the actions interrelate to the proposed action, the analysis employs the measure of "reasonably foreseeable" to include or exclude other actions. For the purposes of this analysis, public documents prepared by federal, state and local government agencies form the primary sources of information regarding reasonably foreseeable actions. Documents used to identify other actions included notices of intent for environmental impact statements (EISs) and EAs, management plans, land use plans, other NEPA studies, and economic and demographic projections.

4.3 PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS

Numerous other activities exist in the ROI. The activities described here are by no means inclusive, but serve to highlight some major influences in the region and to provide perspective on the contribution to any impacts generated by the proposed action.

4.3.1 U.S. Coast Guard

The Coast Guard has used and will continue to use the Gulf of Mexico for training purposes as well as for day to day operations. The Coast Guard is involved in a variety of missions in the Gulf of Mexico including search and rescue, marine environmental protection, enforcement of laws and treaties, drug interdiction, marine safety, and national security. The types of materials used during Coast Guard search and rescue operations are similar to those proposed for use in the WTA. During training operations, the Coast Guard typically attaches lightsticks directly to personnel survival suits or to strings leading back to the surface ships. Therefore, the Coast Guard is generally able to recover all of the lightsticks deployed during a training exercise.

4.3.2 Non-Federal Actions

There are no known state, county or municipality actions that are proposed or planned within the ROI that would directly interact with the proposed action.

With respect to activities in the Gulf of Mexico, the northern Gulf of Mexico coastal zone is one of the major recreational regions of the U.S., particularly for marine fishing and beach activities. Its resources include coastal beaches, barrier islands, coral reefs, estuarine bay and sounds, river deltas, and tidal marshes. Many of these are held in trust for the public under federal, state, and local jurisdiction. Commercial facilities such as resorts and marinas are also primary areas for tourist activity. Outdoor recreational activity in the gulf is primarily located along the shoreline and is associated with accessible beach areas. Beaches are a major focal point for tourism as well as a primary source of recreational activity for residents.

4.4 CUMULATIVE EFFECTS SUMMARY

The key issues and primary resource areas of interest in this EA are marine biological resources and issues involving marine debris. No other resource areas were found to have any measured effect resulting from implementation of the Proposed Action. The incremental contribution of impacts of the Proposed Action, when considered in combination with other past, present, and reasonably foreseeable actions would be negligible.

In summary, none of the projected impacts of the proposed action and alternatives are significant in themselves. At this time, there are no known existing actions, or current future proposals, from which a significant cumulative impact in the ROI could result when combined with the effects of the proposed training in the Gulf of Mexico.

CHAPTER 5
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

NEPA requires that environmental analysis include identification of "…any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented." Irreversible and irretrievable resource commitments are related to the use of nonrenewable resource and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species or the disturbance of a cultural site).

For the proposed action, most resource commitments are neither irreversible nor irretrievable. Most impacts are short-term and temporary, or longer lasting, but negligible. Those limited resources that may involve a possible irreversible or irretrievable commitment under the proposed action are discussed below.

The proposed action would require the use of fuels for aircraft operations. This fuel would be used as long as the PR programs continued. Other materials that would be consumed include sea dye markers, flares, and lightsticks in the WTA.

Since no construction or renovation would occur as part of the proposed action, no materials required for this type of activity would be used. There would be no irreversible or irretrievable commitments of construction materials such as concrete, sand, bricks, and steel, or materials used for renovation such as insulation, wiring, and paint.

There would be no wildlife habitat lost through implementation of the proposed action. No irreversible or irretrievable commitment of biological resources would occur.

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CHAPTER 6
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CHAPTER 7
LIST OF PREPARERS

This EA was prepared for Moody AFB under contract to the USACE, Fort Worth District. The Air Force's Project Manager for its preparation is:

Greg Lee
Natural Infrastructure Management Element
Moody AFB Asset Management Flight
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A list of primary technical analysts contributing to the preparation of this EA includes:

RICK SPAULDING, Project Manager and Senior Biologist
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APPENDIX A:

AGENCY AND PUBLIC CORRESPONDENCE/COORDINATION

DEPARTMENT OF THE AIR FORCE
23RD CIVIL ENGINEER SQUADRON (ACC)
MOODY AIR FORCE BASE GEORGIA

MAY 28 2009

MEMORANDUM FOR NATIONAL MARINE FISHERIES SERVICE (NMFS)
SOUTHEAST REGIONAL OFFICE
PROTECTED RESOURCES DIVISION
ATTN: Mr. Robert Hoffman
263 13th Avenue South
St. Petersburg FL 33701

FROM: 23 CES/CC
3485 Georgia Street
Moody AFB GA 31699-1707

SUBJECT: Biological Evaluation for Potential Effects on NMFS-listed Species from Continued Air Force Combat Search and Rescue (CSAR) Operations within the Gulf of Mexico Water Training Area (WTA)

1. In accordance with Section 7 of the Endangered Species Act, Moody Air Force Base (AFB) is submitting a Biological Evaluation (BE) (attachment) of the potential effects of continued CSAR training operations within the Gulf of Mexico WTA on listed threatened and endangered species under the jurisdiction of the National Marine Fisheries Service. This BE specifically addresses the proposed action of continued CSAR operations within the WTA, including the use of HH-60 helicopters and fixed-wing aircraft (HC-130s), training materials (e.g., lightsticks, sea dye packs, and flares), and in-water activities involving the use of surface vessels (i.e., Zodiac inflatable boat and Boston whaler), scuba, and the insertion and extraction of CSAR personnel.

2. The environmental effects of the establishment of the WTA and associated CSAR training operations by Moody AFB were analyzed in an Environmental Assessment (EA) with a Finding of No Significant Impact (FONSI) signed 30 December 1999. Formal consultation under Section 7 of the ESA was conducted between the Air Force and the National Marine Fisheries Service (NMFS), St. Petersburg, Florida, office to address potential impacts to federally listed marine species within the action area, in particular sea turtles. A Biological Opinion (BO) and Incidental Take Statement (ITS) was issued on 22 December 1999.

3. As part of the terms and conditions of the 1999 BO and ITS, NMFS outlined annual reporting requirements to track the use of lightsticks and sea dye packs within the WTA during CSAR training operations. The analysis presented in this BE is based upon the monitoring reports prepared by the Air Force for CSAR operations and materials usage from 2000 thru 2008 and updated species and regional information since the preparation of the 1999 EA. No impacts to listed species from CSAR operations were observed or recorded during the 2000-2008 monitoring period. Because the December 1999 BO covered only a 10-year period and is due to expire in December 2009, the Air Force is requesting reinitiation of formal Section 7 consultation in accordance with the BO to reassess on-going training operations by Moody AFB within the WTA. This BE supports the reinitiated Section 7 consultation.

4. The Air Force began coordination and informal consultation with the NMFS concerning this project and the listed species that occur in the project area in November 2008 through a series of communications with Mr. Eric Hawk and Ms. Kelly Shotts of your office. A subsequent meeting was held in St. Petersburg on 11 February 2009 with Ms. Shotts to discuss the approach to the reinitiated consultation, the previous reporting requirements under the 1999 BO, and to collect additional data pertaining to marine fauna in the Gulf of Mexico that may pertain to the impact analysis. A draft copy of the BE was forwarded to Ms. Shotts on 30 April 2009 to allow NMFS the opportunity to comment on the approach, content, and conclusions of the BE prior to finalization and reinitiation of formal consultation.

5. Based upon the NMFS-provided list of species within the action area and consultations with your staff, the attached BE evaluated the environmental effects of continued CSAR training on five listed species. Our analysis resulted in a finding of "May affect, is likely to adversely affect" for the five listed species in Table 1.

Table 1. ESA-Listed Species Potentially Occurring within the Action Area

Common Name (Scientific Name)	*ESA Status*
Green sea turtle (*Chelonia mydas*)	Endangered
Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Loggerhead sea turtle (*Caretta caretta*)	Threatened

6. The Air Force is requesting the reinitiation of formal consultation per Section 7 of the ESA and requests that the NMFS review the BE and provide a BO on the effect determinations from the proposed action as described in the BE. If you have any questions or need any additional information, please contact Mr. Gregory Lee at 229-257-5881 or by e-mail at gregory.lee@moody.af.mil.

Greg Williams

GREG A. WILLIAMS, Lt Col, USAF
Commander

Attachment
Biological Evaluation (BE)

DEPARTMENT OF THE AIR FORCE
23RD CIVIL ENGINEER SQUADRON (ACC)
MOODY AIR FORCE BASE GEORGIA

MEMORANDUM FOR ALL INTERESTED GOVERNMENT AGENCIES, INDIVIDUALS, ORGANIZATIONS, AND PUBLIC LIBRARIES

FROM: Natural Infrastructure Management Element
Moody AFB Asset Management Flight
23 CES/CEAN
3485 Georgia St.
Moody AFB GA 31699-1707

SUBJECT: Draft Final Environmental Assessment (EA) for Continued Combat Search and Rescue (CSAR) Training Operations within the Previously Established Water Training Area (WTA) in the Gulf of Mexico

1. Moody Air Force Base (AFB), GA, has prepared a Draft Final EA and Finding of No Significant Impact (FONSI) for continued CSAR training operations being conducted within the previously established WTA within Apalachee Bay in the northeastern Gulf of Mexico. This EA specifically addresses the Proposed Action of continued CSAR operations within the WTA, including the use of HH-60 helicopters and HC-130 fixed-wing aircraft and training materials, and conducting in-water activities. Under the Proposed Action, the WTA established in 1999 by the Air Force would continue to be used to support CSAR training by the 41st and 71st Rescue Squadrons (RQS) and paradrop exercises by the 38 RQS.

2. Enhanced training is necessary to maintain the CSAR capability of the 38 RQS, 41 RQS, and 71 RQS. Their primary mission is to provide worldwide, deployable long-range CSAR of downed aircrew members. Secondary missions include providing air rescue capability for Moody AFB and long-range civilian search and rescue capability for the region. These complex missions require distinct tasks and skills that involve frequent, repetitive training to maintain combat proficiency. The Proposed Action would best meet that need by continuing to use the existing WTA in the Gulf of Mexico.

3. This draft EA and FONSI are being provided to you for review and comment. We request that libraries post this document to facilitate public access during the comment period.

4. Please provide any comments or additional information to our office by 7 July 2009. Comments can be mailed to the address below or can be e-mailed to: johnna.thackston@moody.af.mil.

Natural Infrastructure Management Element
Moody AFB Asset Management Flight
23 CES/CEAO
Attn: Ms. Johnna Thackston
3485 Georgia St.
Moody AFB, GA 31699-1707

Gregory W. Lee

GREGORY W. LEE
Natural Resources Management Element
Moody AFB Asset Management Flight

Attachment

IICEP DISTRIBUTION LIST FOR THE EA FOR CONTINUED CSAR TRAINING WITHIN THE GULF OF MEXICO WTA BY HH-60 AND HC-130 RESCUE SQUADRONS FROM MOODY AFB, VALDOSTA, GA

Title/Org.	*Name*	*Address*
FEDERAL		
NMFS	Mr. Eric Hawk	263 13th Avenue South Saint Petersburg, Florida 33701
USFWS, Region 4	Ms. Moreen Walsh	1875 Century Blvd Atlanta, GA 30345
USFWS, Panama City Field Office	Mr. Hildreth Cooper	1601 Balboa Avenue Panama City, FL 32405
USFWS, St. Marks NWR	Mr. James Burnett	P.O. Box 68 St. Marks, FL 32355
STATE		
FL State Clearing House	Lauren Milligan	3900 Commonwealth Blvd. Mail Station 47 Tallahassee, FL 32399
GA State Clearing House	Attn: Barbara Jackson	Georgia State Clearing House 270 Washington Street, S.W. – 8th Floor Atlanta, GA 30334
LOCAL		
Assistant County Administrator, Wakulla County, Florida	Ms. Lindsay Stevens	Wakulla County Board of County Commissioners P.O. Box 1263 Crawfordville, FL 32326
Planning Official Jefferson County, FL	Mr. Bill Tellefsen	Jefferson County Board of County Commissioners 445 West Palmermill Road Monticello, FL 32344
Library Distribution		
Jefferson County Public Library	Ms. Verna Brock	260 N. Cherry St. Monticello, FL 32345
South Georgia Regional Library	Library	300 Woodrow Wilson Dr. Valdosta, GA 31698

Williams improvements, incubator encourage growth

DESPINA WILLIAMS | The Star

A park named for the late Port St. Joe physician, Dr. Joseph P. Hendrix, was the Port St. Joe Redevelopment Agency's first Williams Avenue project. The park features a metal sculpture of Hendrix's beloved dog, Gator.

By Despina Williams
Star Staff Writer

With two back-to-back ribbon cuttings on May 21, the city of Port St. Joe showcased two renovation projects intended to revive and expand the business community.

The city and partnering agencies completed aesthetic and infrastructure improvements along Williams Avenue and converted a former school building into a business incubator.

The United States Department of Agriculture (USDA), Rural Development contributed significant funds to both projects.

The agency provided $100,000 for the Williams Avenue improvements and a $117,870 Rural Business Enterprise Grant for the business incubator.

The Port St. Joe Redevelopment Agency (PSJRA) took a leading role in the Williams Avenue project, providing nearly $101,000 (the city chipped in $25,000), and securing the initial USDA grant.

Improvements along Williams Avenue include enhanced storm drainage, paved on-street parking spaces, brick paver crosswalks and landscaping.

The first major renovation to the avenue came in the form of a park named for the late Port St. Joe physician, Dr. Joseph P. Hendrix.

Former PSJRA director Gail Alsobrook worked closely with the Hendrix family and project engineers Preble-Rish to get everything just right, down to the metal sculpture of Hendrix's beloved dog, Gator.

"We had many, many walks out here to tweak things," said Alsobrook, on hand for the dedication.

Alsobrook listed her priorities for the project as "drainage first, pedestrian safety, then aesthetics."

Heavy rainfall often made a swamp of certain segments of the avenue, particularly around Decorative Flooring and Sassy Nails.

Bill Kennedy of Preble Rish vouched for his work, saying that since the improvements, the avenue has "gone through the worst event it can go through, rain intensity wise. It survived the worst

See GROWTH A7

NOTICE OF AVAILABILITY OF DRAFT FINAL ENVIRONMENTAL ASSESSMENT (EA)

The U.S. Air Force is announcing the availability of the Draft Final EA that addresses the Proposed Action of continued Combat Search and Rescue (CSAR) operations within the previously established Water Training Area in the northern Gulf of Mexico, including the use of HH-60 helicopters and HC-130 fixed-wing aircraft and training materials, and conducting in-water activities. This action would support continued CSAR training of the Rescue Squadrons stationed at Moody Air Force Base, Georgia.

The Air Force has prepared an EA summarizing the potential environmental impacts of the proposed action on the environment. It is available to any person for review for a 30-day review period following the publication of this Notice and prior to any decision by the Air Force to proceed with the proposed action or alternatives. The document is available for viewing at the following locations: Jefferson County Public Library, 260 N. Cherry St., Monticello, FL; and South Georgia Regional Library, 300 Woodrow Wilson Dr., Valdosta, GA. For more information contact: Lt Col Lesa Spivey, 23rd Wing, Public Affairs, Moody AFB, 229-257-2400. Anyone wishing to submit written comments may mail them to the attention of Ms. Johnna Thackston, 23 CES/CEAO, 3485 Georgia Street, Moody AFB GA 31699-1707.

CLARK

From Page 1B

— properly educating women and girls about their health, including their reproductive health. Additionally, the marketing of another drug through a chatty advertising campaign (can't flip through a single issue of a fashion magazine without finding mention of it) revealed that too many are willing to down play a health risk that is permanent and can be life-threatening.

In the July issue of *Glamour* magazine, a reader wrote in about her abnormal Pap smear, only to be told by the responding physician that, in most cases, an abnormal Pap result can clear up on its own. True enough, the cell mutations that can indicate the presence of HPV often do seemingly reverse themselves and disappear when subsequent tests are administered six months to a year later.

But HPV is a virus. It can lie dormant in the body with little to no physical manifestation.

It also can kill.

Jade Goody's name may not ring many bells on this side of the pond, but the British reality TV star grew to fame in 2002 by appearing on the TV show "Big Brother." After a controversy about her using a racial epithet against another cast member, she appeared on the Indian version of the show, where she learned of her cervical cancer diagnosis. In an effort to educate others about the disease, Goody employed Britain's celeb-focused media to document her fight against her metastasized cancer. She died in March at age 27, leaving behind two sons and her husband of one month.

It shouldn't take a story like Goody's — one highlighted by celebrity — to draw attention to a serious disease. Nor should it take a catchy marketing campaign for the people who've brought new human bodies into the world to tell them about the many risks of exposing that body to harm.

Abstinence and celibacy work when they are taught early, reinforced and, most importantly, practiced. When they are not, there's some comfort in knowing that there are measures that exist to protect us from the threats of death and disease. But the existence of a vaccine, condoms and other prophylactics can never replace knowledge and wise judgment as our best means of protection. Taking consumerism and cause-celebre out of the picture must be a top priority if the spread of HPV is to be curbed. Many an avoidable diagnosis of life-changing or life-ending disease depend on it.

■ Contact Associate Editor Meredith Clark at (850) 599-2258 or mclark@tallahasee.com.

Public Hearing for the Annual Action Plan

The Annual Action Plan is required by the US Department of Housing and Urban Development (HUD) as a prerequisite for the City of Tallahassee to receive certain formula grant allocations. This planning and application document is required for the Community Development Block Grant (CDBG), HOME, and Emergency Shelter Grant (ESG) programs. Proposed funding allocations (including the proposed use of the new state-funded Florida Housing Opportunity Program [FHOP] funds), are shown below. The comment period for the City of Tallahassee's Annual Action Plan will begin on June 5, 2009 and will close July 1, 2009. A draft of the Annual Action Plan will be available for review during this period at the Economic and Community Development Department (ECD) office, located at 435 N. Macomb St., 3rd Floor, between the hours of 8:00 AM and 5:00 PM. The draft Annual Action Plan will also be posted online at Talgov.com. A public hearing will be held at City Hall on Wednesday, July 1, 2009 in the City Commission Chambers. If you have any comments, they may be made at the hearing or submitted in writing to Economic and Community Development, Attention: Gwen Lightfoot, 300 South Adams Street, Box B-27, Tallahassee, FL 32301-1731.

ANTICIPATED REVENUES	CDBG	HOME	SHIP	FHOP*	ESG	TOTAL
Anticipated Grant Awards	$1,929,816	$1,204,699	$0	$260,000	$84,076	$3,478,591
Funds Available for Reprogramming	$299,073	$377,519	$1,035,000		$180	$1,711,772
Total Anticipated Funding Sources	**$2,228,889**	**$1,582,218**	**$1,035,000**	**$260,000**	**$84,256**	**$5,190,363**

EXPENDITURES TO BE RESERVED	CDBG	HOME	SHIP		ESG	TOTAL
ADMINISTRATION	$385,963	$120,470	$0	$26,000		$532,432
Fair Housing--$10,000 (part of Admin.)						

PUBLIC NOTICES

Sales/Foreclosures

gpn11

NOTICE OF SALE UNDER POWER

GEORGIA, LOWNDES COUNTY

Because of default in the payment of the indebtedness, secured by a Security Deed [illegible] described property to secure a Note in the original principal amount of ONE HUNDRED THIRTEEN THOUSAND TWO HUNDRED TWENTY-THREE AND 0/100 DOLLARS ($113,223.00), with interest thereon as set forth therein, there will be sold at public outcry to the highest bidder for cash before the courthouse door of Lowndes County, Georgia within the legal hours of sale on the first Tuesday in July, 2009, the following described property: SEE EXHIBIT A ATTACHED HERETO AND MADE A PART HEREOF

The debt secured by said Security Deed has been and is hereby declared due because of, among other possible events of default, failure to pay the indebtedness as and when due and in the manner provided in the Note and Security Deed. The debt remaining in default, this sale will be made for the purpose of paying the same and all expenses of this sale, as provided in Security Deed and by law, including attorneys fees (notice of intent to collect attorneys fees having been given).

Said property will be sold subject to any outstanding ad valorem taxes (including taxes which are a lien, but not yet due and payable), any matters which might be disclosed by an accurate survey and inspection of the property, any assessments, liens, encumbrances, zoning ordinances, restrictions, covenants, and matters of record superior to the Security Deed first set out above.

The entity that has full authority to negotiate, amend, and modify all terms of the mortgage with the debtor is: Wells Fargo Home Mortgage, Inc., PO Box 10335,

Sales/Foreclosures

Des Moines, IA 50306, 1-800-416-1472. Please understand that the secured creditor is not required by law to negotiate, amend, or modify the terms of the mortgage instrument.

To the best knowledge and belief of the [illegible]

Georgia, pursuant to O.C.G.A. § 19-8-10(c).

WITNESS my hand and the seal of said Court at Valdosta, Georgia on this the ______ day of ______________, 2009.

Judge,
Lowndes County Superior Court

PATRICIA McCORVEY KARRAS
DOVER MILLER STONE & KARRAS, P.C.
P. O. Box 729
Valdosta, GA 31603-0729

23556925
06/29;06/5,12/09

gpn07

NOTICE TO DEBTORS AND CREDITORS

STATE OF GEORGIA,
COUNTY OF LOWNDES

All creditors of the estate of JAMES LEE LIGHTSEY, deceased, late of Lowndes county, Georgia, are hereby notified to render in their demands to the undersigned according to law, and all persons indebted to said Estate are required to make immediate payment to me.

This the 6th day of May, 2009

James Ellis Lightsey
Executor of
James Lee Lightsey, deceased
196 Deerwood Circle
Fitzgerald, GA 31750
23556857
05/15,22,29;06/05/09

Court Petitions

gpn15
IN THE SUPERIOR COURT OF LOWNDES COUNTY
STATE OF GEORGIA

Civil Action file No. 2009CVD1350

IN THE SUPERIOR COURT OF LOWNDES COUNTY

STATE OF GEORGIA

CIVI ACTION
FILE NO: 2009-CVD-1157

COMPLAINT FOR DIVORCE BY PUBLICATION

HARRY ANDY CORBETT,
Plaintiff,
VS.,
JESSICA JOY JONES CORBETT,

NOTICE OF PUBLICATION

By Order for service by publication dated the 29th day of April, 2009, you are notified that on the 29th day of April, 2009, **your husband, HARRY ANDY CORBETT** filed suit against you for divorce.

You are hereby required to file with the Clerk of Superior Court, and to serve upon Plaintiff's attorney, Mr. William H. Kitchens, 3525 North Crossing Circle, Post Office Box 2123, Valdosta, Lowndes County, Georgia 31603-2123 an Answer in writing with sixty (60) days of the date of the Order for Publication.

This 1st day of May, 2009.

Sara L. Crow
Clerk, Superior Court
Lowndes County, Georgia

MR. WILLIAM H. KITCHENS
Attorney at Law
3525 North Crossing Circle
Post Office Box 2123
Valdosta, Georgia 31604-2123
(229) 242-6255
State Bar No: 424600

23556884
05/22,29;06/05,12/09

Court Petitions

gpn18

NOTICE

GEORGIA, LOWNDES COUNTY
PROBATE COURT

TO: [illegible]

with the Georgia Department of Human Resources, acting through the Lowndes County Department of Family and Children Services, was filed in said Court on May 12, 2009, and that by reason of the Order for Service by Publication entered by

Court Petitions

the Court on May 12, 2009, you are hereby commanded and required to file with the Clerk of Said Court and serve upon CHARLES R. REDDICK, Attorney for Petitioner, whose address [illegible]

Further, pursuant to O.C.G.A. 15-11-96(i):
"A biological father who is not the legal father loses all rights to the child and the court shall enter an order terminating all such father's rights to the child and such father

Court Petitions

may not thereafter object to the termination of his rights to the child if within 30 days from his receipt of the notice provided for in subsection (e) of this Code section he: (1) Does not file [illegible]

NOTICE OF AVAILABILITY OF DRAFT FINAL ENVIRONMENTAL ASSESSMENT (EA)

The U. S. Air Force is announcing the availability of the Draft Final EA that addresses the Proposed Action of continued Combat Search and Rescue (CSAR) operations within the previously established Water Training Area in the northern Gulf of Mexico, including the use of HH-60 helicopters and HC-130 fixed-wing aircraft and training materials, and conducting in-water activities. This actions would support continued CSAR training of the Rescue Squadrons stationed at Moody Air Force Base, Georgia.

The Air Force has prepared and EA summarizing the potential environmental impacts of the proposed action on the environment. It is available to any person for review for a 30-day review period following the publication of this Notice and prior to any decision by the Air Force to proceed with the proposed action of alternatives. The document is available for viewing at the following locations: Jefferson County Public Library, 260 N. Cherry St., Monticello, FL; and South Georgia Regional Library, 300 Woodrow Wilson Dr., Valdosta, GA. For more information contact: Lt Col Lesa Spivey, 23rd Wing, Public Affairs, Moody AFB, 229-257-2400. Anyone wishing to submit written comments may mail them to the attention of Ms. Johnna Thackston, 23 CES/CEAO, 3485 Georgia Street, Moody AFB GA 31699-1707.

530233slbv

APPENDIX **B:**

NMFS BIOLOGICAL OPINION

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
(727) 824-5312; FAX 824-5309
http://sero.nmfs.noaa.gov

APR 22 2010 F/SER31:KS

LTC Gregory A. Williams, USAF
23 CES/CC
3485 Georgia Street
Moody Air Force Base, Georgia 31699-1707

Dear Colonel Williams:

The enclosed document constitutes the National Marine Fisheries Service's (NMFS) biological opinion (opinion) based on our review of the U.S. Air Force's (USAF) request for formal consultation on the effects of continuing its Combat Search and Rescue (CSAR) training operations within the Gulf of Mexico Water Training Area (WTA), Apalachee Bay, off Franklin, Wakulla, Jefferson, and Taylor Counties, Florida. This opinion is based on project-specific information provided by the USAF, as well as NMFS' review of published literature.

The proposed action is the continued CSAR training operations by the 38th, 41st, and 71st Rescue Squadrons within the WTA and will include the use of aircraft, marine vessels, and training materials (such as lightsticks, sea dye packs, and flares.) The opinion analyzes the proposed action's effects on listed sea turtles. NMFS concludes that the project is not likely to jeopardize the continued existence of loggerhead, Kemp's ridley, green, hawksbill, or leatherback sea turtles.

We look forward to further cooperation with you on other USAF projects to ensure the conservation of our threatened and endangered marine species and designated critical habitat. If you have any questions, please contact Kelly Shotts at (727) 824-5312, or by e-mail at Kelly.Shotts@noaa.gov.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure

File: 1514-22.S.USAF
Ref: F/SER/2009/02629

Endangered Species Act - Section 7 Consultation
Biological Opinion

Action Agency:	U.S. Department of the Air Force 23rd Civil Engineer Squadron (ACC) Moody Air Force Base, Georgia
Activity:	Continued Combat Search and Rescue Training Operations within the Gulf of Mexico Water Training Area (Consultation Number F/SER/2009/02629)
Consulting Agency:	National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), Southeast Regional Office, Protected Resources Division, St. Petersburg, Florida
Approved by:	Roy E. Crabtree, Ph.D., Regional Administrator NMFS, Southeast Regional Office St. Petersburg, Florida
Date Issued:	

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Background

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 *et seq.*), requires that each federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species; section 7(a)(2) requires federal agencies to consult with the appropriate Secretary on any such action. NMFS and the U.S. Fish and Wildlife Service (USFWS) share responsibilities for administering the ESA: if the subject species is cited in 50 CFR 223.102(a) or 224.101 the federal agency shall contact NMFS, otherwise the federal agency shall contact USFWS (50 CFR 402.01).

Consultation is required when a federal action agency determines that a proposed action "may affect" listed species or designated critical habitat. Consultation is concluded after NMFS determines the action is not likely to adversely affect listed species or critical habitat, or issues a biological opinion (opinion) that identifies whether a proposed action is likely to jeopardize the continued existence of a listed species, or destroy or adversely modify critical habitat. The opinion states the amount or extent of incidental take of the listed species that may occur, develops measures (i.e., reasonable and prudent measures) to reduce the effect of take, and recommends conservation measures to further conserve the species. Notably, no incidental destruction or adverse modification of critical habitat can be authorized, and thus there are no reasonable and prudent measures, only reasonable and prudent alternatives that must avoid destruction and adverse modification.

This document represents NMFS' opinion based on our review of impacts associated with the U.S. Department of the Air Force's (USAF) continued combat search and rescue (CSAR) training operations within the Gulf of Mexico Water Training Area (WTA) off the coast of Florida. The CSAR training operations will be conducted by personnel from Moody Air Force Base (AFB). This opinion analyzes project effects on listed sea turtles in accordance with section 7 of the ESA.

This opinion is based on project information provided by the USAF and other sources of information, including published literature and summary reports provided by USAF.

BIOLOGICAL OPINION

1.0 CONSULTATION HISTORY

NMFS received a request for reinitiation of ESA consultation on the continued CSAR training operations in the WTA from USAF by letter dated June 4, 2009. USAF analyzed the establishment of the WTA and the associated CSAR training operations in a biological assessment completed in 1999 and requested consultation with NMFS to address potential impacts to sea turtles. NMFS completed formal consultation on the project on December 22, 1999. NMFS' opinion covered a 10-year period, with expiration occurring in December 2009.

NMFS received notification from USAF via e-mail on November 7, 2008, that reinitiation of ESA section 7 consultation would be necessary because it was USAF's intent to continue the CSAR training operations. USAF requested a meeting with NMFS and provided preliminary project details for review. NMFS met with USAF personnel and the applicant's agent at the Southeast Regional Office on February 11, 2009, to discuss the preliminary project details, data collected during the previous 10-year CSAR training operations period, and logistics of the ESA section 7 consultation process. Following the meeting, USAF provided additional information (a 2002 marine debris study, annual marine debris reports from the previous 10-year CSAR training period, and a marine debris outreach brochure developed by USAF) to NMFS via e-mail on February 13 and 15, 2009.

USAF provided an advance draft of the Biological Evaluation (BE) via e-mail on April 30, 2009, and requested NMFS provide comments. NMFS replied via telephone on May 18, 2009, that the draft BE appeared to be complete. On May 28, 2009, USAF requested reinitiation of ESA section 7 consultation and submitted the final BE for the project. USAF determined the project is likely to adversely affect listed sea turtles (green, hawksbill, Kemp's ridley, leatherback, and loggerhead) under NMFS' purview. Formal consultation was initiated on September 10, 2009.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

Proposed Action

The proposed action consists of the continued CSAR training operations by the 38th, 41st, and 71st Rescue Squadrons (RQS) within the WTA, including:

- the use of HH-60 helicopters and fixed-wing aircraft (HC-130s)
- the use of training materials (e.g., lightsticks, sea dye packs, and flares)
- the use of surface vessels (i.e., Zodiac inflatable boat and Boston whaler)
- in-water activities, such as scuba operations and the insertion and extraction of CSAR personnel

Although the proposed action is currently projected to take place indefinitely, this opinion will analyze the proposed action's effects on listed species over a 10-year period. If the proposed action continues after the 10-year period, its effects on listed species will have to be reanalyzed.

38 RQS WTA Operations

Approximately 70 paradrop exercises or "water deployments" would be conducted in the WTA by the 38 RQS annually. Water deployments would consist of personnel jumps, deployment of Combat Rubber Raiding Craft (CRRC), HH-60 helicopter water operations, and/or scuba qualification dives. A water deployment could involve all of these training activities in a single exercise or deployment, only one specific activity, or any combination. These water deployments would be split evenly between daytime and night (after dark) operations. Night vision goggles will be used by aircraft operators during night operations. Specific training activities are described in detail below. All 38 RQS operations support 41 and 71 RQS operations and will occur concurrently with them.

Personnel Jumps. A surface support safety boat (27-foot Boston Whaler) departs a local St. Marks, Florida, marina and transits to the WTA. Aircraft, either HH-60s or HC-130s, arrive over the WTA several minutes later. Radio contact is established between the safety boat and the aircraft, and the WTA is surveyed for the presence of sea turtles or marine mammals, and to confirm that there are no hazardous conditions in the area, such as other vessels. Once surveys are completed, the aircraft drops a paper streamer from 1,500 or 3,000 feet, depending on the type of parachute to be used during training. The streamer, which is made of crepe paper and dissolves in water, is used to determine the release point for jumpers. Personnel then complete the jump into the WTA. Following the jump, personnel would be recovered by the safety boat or by HH-60s. To the maximum extent practicable, the safety boat would recover any expended equipment or debris from the training exercise that remains in the WTA and then return to the marina. The entire operation takes approximately 90 minutes and involves three to eight people utilizing either one HC-130 or two HH-60s.

CRRC Airdrop. The CRRC (an inflatable, motorized Zodiac boat) may be deployed from an HH-60 or HC-130 by one of three methods:

- Tethered Duck method, which involves lowering the CRRC from an HH-60 at less than 30 feet MSL in a controlled manner.
- Kangaroo Duck method, during which the CRRC is released from an HH-60 less than 10 feet MSL in a free-fall
- Rigging Alternate Method Zodiac (RAMZ), during which the CRRC, along with an outboard engine, fuel, and medical equipment, is bundled into a 4-foot cube and parachuted out of an HC-130 at 3,500 feet MSL.

The CRRC drop is similar to the personnel jump in support requirements and procedures. The surface support safety boat departs a local marina and transits to the WTA. Aircraft arrive over the WTA several minutes later. Radio contact is established between the safety boat and the aircraft, and the WTA is surveyed for the presence of sea turtles or marine mammals, and to confirm that there are no hazardous conditions in the area, such as vessels. A second CRRC and an additional three to four parajumpers may be deployed during one exercise. However, due to logistical issues, it is highly unlikely that more than one HH-60 or HC-130 would be dropping CRRCs during a training operation. Once all equipment is recovered, personnel return to the local marina. This operation takes approximately 2 hours to complete.

HH-60 Helicopter Water Operations. The surface support safety boat departs a local marina and transits to the WTA. HH-60s arrive over the WTA several minutes later. Radio contact is established between the safety boat and the aircraft, and the WTA is surveyed for the presence of sea turtles or marine mammals, and to confirm that there are no hazardous conditions in the area, such as other vessels. The helicopter hovers about 10 feet above the water while three to six parajumpers exit the helicopter in a procedure called "a low and slow." The helicopter moves away from the parajumpers to simulate departing the area. The helicopter returns and hovers while a rope ladder is lowered to recover personnel.

Scuba Qualification Dives. This operation is identical to the RAMZ drop; however, the parajumpers also conduct scuba operations with the RAMZ training. Seconds after the drop of the RAMZ package, three to four parajumpers with scuba equipment exit the aircraft and land downwind of the RAMZ. They inflate the raft and start the engine. Additionally, during this exercise, two divers are in the water conducting scuba operations while two personnel remain within the RAMZ. The exercises include underwater search patterns, deep dives to a maximum depth of 135 feet, and navigational dives at a 20-foot depth and for a distance of 9,840 feet. Search patterns include the use of a rope grid, which is recovered at the completion of the exercise. Parajumpers recover their personal chutes while the safety boat recovers the RAMZ packing material and RAMZ chutes. Once all equipment is recovered, personnel return to a local marina. This operation takes approximately 3 hours to complete.

41 RQS WTA Operations

Operations conducted by the 41 RQS consist of helicopters flying to the WTA and performing CSAR training operations over a specific location within the WTA. The use of the WTA by HH-60 aircrews averages nine 1-hour operations per week (approximately 37 per month, or 449 per year). Approximately half of the annual WTA operations will occur after dark. While daytime training may involve the use of either one or two helicopters, flight operations after dark require the use of two helicopters to maximize flight safety. The helicopters transit to the WTA from Moody AFB at 500 feet above ground level within the Moody Low-Altitude Tactical Navigation (LATN) area. A LATN area covers large areas of uncontrolled airspace and facilitates operational flexibility (flight patterns are not confined to narrow flight corridors and direction of flight is not restricted).

Once within WTA boundaries, the helicopters operate between 10 and 200 feet mean sea level (MSL) during the entire CSAR training operation. While a typical HH-60 operation consists of a helicopter entering the WTA and dropping to 100 feet MSL, an HH-60 conducts CSAR operations at varying altitudes during the maximum operation time of 1 hour. The helicopter would spend approximately 5 minutes at 10 feet MSL, 15 minutes at 30-50 feet MSL, and 40 minutes at 150 feet MSL. Flares are dropped during CSAR training exercises in the WTA and the smoke from the flares is used to check wind direction. Daytime CSAR training in the WTA involves the use of sea dye markers dropped from the helicopter to mark the location of a survivor. The markers also provide a navigational aid for the helicopter aircrew.

Since HH-60 aircrews train with night vision goggles after dark, WTA training operations also involve the use of lightsticks. Lightsticks are dropped from the helicopter to monitor the survivor's position relative to the helicopter. Lightsticks are used instead of flares because flares can blind pilots who are using night vision goggles, and flares also mark for the enemy both the survivor's and the rescuer's location in a hostile environment. Use of flares, sea dye markers, and lightsticks is summarized in Table 1.

Table 1. Proposed Annual Lightstick, Sea Dye, and Flare Usage in the WTA

	Lightsticks	Sea Dye Markers	Flares MK25	Flares MK6
38 RQS	3,000	250	0	0
41 RQS	11,000	700	175	175
71 RQS	0	500	1600	600
Total	14,000	1,450	2,550	

During some of the training operations, parajumpers exit the helicopter to perform simulated search and rescue operations. The parajumpers are dropped at an altitude of approximately 10 feet MSL. Personnel drops and pickups associated with pararescue training operations use rope, rappel, and ladders while the helicopter hovers at 15 to 50 feet MSL. In all circumstances, HH-60 aircrews attempt to avoid boats and other watercraft by a minimum of 1 nautical mile. In addition, aircrews make every reasonable effort to avoid contact or interaction with marine fauna in the WTA.

71 RQS WTA Operations

Proposed operations by the 71 RQS in the WTA consist of two HC-130 flights a week (8 per month, or approximately 100 per year). All HC-130 operations are conducted during the day. A typical HC-130 operation within the WTA consists of one aircraft operating between 150 and 500 feet MSL for approximately 30 minutes to complete a surveillance circle to check for vessels operating in the area. Once a clear area is identified, one flare is dropped to mark the position of a "survivor." Subsequent drops of smaller flares are then conducted to simulate the dropping of survivor kits to the person being rescued. The flares are typically dropped at altitudes of 250 to 350 feet MSL. Sea dye markers are also used to serve as navigational aids during these CSAR training operations.

Lightsticks, Sea Dye Packs, and Flares

Both 41 RQS and 71 RQS WTA operations will use sea dye and two types of flares (MK6 and MK25) as marine location markers. During night operations, the 38 and 41 RQSs would also use lightsticks. Since lightsticks float and are not biodegradable, every practicable effort would be made to retrieve them at the completion of CSAR training operations in the WTA. However, Moody AFB records from the last 10 years of CSAR training operations indicate that less than 25 percent of lightsticks are able to be retrieved by personnel involved in training operations. Estimated annual usage rates for these items are shown in Table 1.

Lightsticks.
Lightsticks are 6 inches long, approximately 0.5 inch in diameter, and constructed of high-density polyethylene that is not considered to be easily biodegradable. Cyalume is the active ingredient that creates the illumination associated with lightstick activation. Dimethyl phthalate is a component of cyalume and possesses a moderate potential to affect some aquatic organisms (Eastman Corporation 1999).

Marine Location Dye Markers (M59 Sea Dye Packs).

The M59 is a marine location dye marker consisting of a heat-sealed plastic laminate bag (about 34 by 17 by 15 inches) filled with 22 ounces of uranine, a non-toxic, non-hazardous liquid dye. The plastic bag is dropped into the water from a minimum height of 50 feet. Upon hitting the water, the bag ruptures, scattering the enclosed dye to form a fluorescent emerald green slick approximately 20 feet in diameter. The slick is visible within a 10-mile radius at an altitude of 3,000 ft MSL for an average of 2 hours. The plastic bag could remain suspended in the water column, sink to the bottom, or wash onshore.

Marine Location Markers (Flares).
The MK6 Mod 3 Marine Location Marker (flare) consists of four pyrotechnic candles contained in a square wooden block (approximately 18 by 17 by 26 inches) with a flat metal nose plate attached. There are four flame and smoke escape holes in the forward end of the signal; each hole is capped and sealed with tape. The MK6 flare uses a pull friction igniter, covered by adhesive tape, and is located in the center of the tail end of the body. The friction and igniter are launched by a sharp pull, either by hand or by a lanyard attached to the structure of the aircraft. The igniter charge initiates a delay fuse, which, after a 90-second interval, ignites the first candle. When the candle begins to burn, the resulting gas pressure forces the metal cap out of the escape hole and breaks the adhesive tape seal, allowing gases to escape and burn. As the first candle burns out, a fuse is ignited which ignites the next candle unit. The successive ignition is repeated until all four candle-units have burned out. The total burning time is approximately 40 minutes.

The MK25 Mod 3 Marine Location Marker (flare) consists of an aluminum body (approximately 55 by 55 by 41 inches) containing a pyrotechnic composition, an electric squib, and a saltwater-activated battery. The base of the flare contains a battery, a safety arm feature that seals the battery cavity, and battery cavity ports. The MK25 flare is launched by rotating base plates from the "safe" to the "armed" position to expose the battery cavity ports. When saltwater enters the battery cavity through the ports, water acts as an electrolyte, activating the saltwater battery. The battery develops sufficient current to initiate an electric squib. The squib ignites a starter mix, which in turn ignites the pyrotechnic composition. Gas pressure forces a valve from the nose of the marker and emits a yellow flame and white smoke for 13 to 18 minutes.

Conservation Measures Incorporated into the Project

The applicant has incorporated the following conservation measures into the project:

1. Prior to the initiation of any CSAR training operations, the WTA will be surveyed by aircraft for the presence of sea turtles and marine mammals, and to confirm that there are no hazardous conditions in the area, such as other vessels. Nighttime surveys will be facilitated by the use of night vision goggles.

2. All CSAR operations would take place at least 1 nautical mile from any observed marine mammal or sea turtle detected during the initial aerial reconnaissance of the WTA.

3. The operator of the safety boat will be instructed to survey the transit path and avoid all sea turtles when traveling to and from the WTA from the St. Marks marina.

4. Every practicable effort will be made to retrieve as many lightsticks as possible upon completion of each CSAR training operation in the WTA. The lightstick recovery rate reported for the previous 10-year period of CSAR training operations was less than 25 percent.

Action Area

The action area is defined by regulation as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action" (50 CFR 402.02). All CSAR training operations will occur in the WTA, which is located in the Gulf of Mexico and is defined by the following boundaries (in WGS84):

Northwest corner:	30.0000°N, 84.1600°W
Northeast corner:	30.0000°N, 83.9900°W
Southeast corner:	29.8300°N, 83.7500°W
Southwest corner:	29.8300°N, 84.1600°W

The project area is within the Big Bend region of Florida, which extends from Anclote Key northwestward to Ochlockonee Point in the Panhandle region, and includes the coastal waters of Pasco, Hernando, Citrus, Levy, Dixie, Taylor, Jefferson, and Wakulla Counties. The action area consists of the marine habitats of the WTA within Apalachee Bay in the northeastern Gulf of Mexico and bordering Franklin, Wakulla, Jefferson, and Taylor Counties.

3.0 STATUS OF LISTED SPECIES AND CRITICAL HABITAT

The following endangered (E) and threatened (T) marine mammal, sea turtle, and fish species, and designated critical habitat under the jurisdiction of NMFS may occur in or near the action area:

Common Name	Scientific Name	Status
Marine Mammals		
Blue whale	*Balaenoptera musculus*	E
Humpback whale	*Megaptera novaeangliae*	E
Fin whale	*Balaenoptera physalus*	E
Sei whale	*Balaenoptera borealis*	E
Sperm whale	*Physeter macrocephalus*	E
Sea Turtles		
Leatherback sea turtle	*Dermochelys coriacea*	E
Hawksbill sea turtle	*Eretmochelys imbricata*	E

Kemp's ridley sea turtle	*Lepidochelys kempii*	E
Green sea turtle	*Chelonia mydas*[1]	E/T
Loggerhead sea turtle	*Caretta caretta*	T
Fishes		
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	T
Smalltooth sawfish	*Pristis pectinata*	E

Designated Critical Habitat
There is no designated critical habitat in the action area.

3.1 Listed Species Not Likely to be Affected

3.1.1 Marine Mammals

NMFS believes that sperm, blue, fin, humpback, and sei whales are not likely to be adversely affected by the proposed CSAR training operations in the WTA since these are deepwater species unlikely to be found in the project area; thus, they are not considered further in this opinion. However, it should be noted that incidental take of any marine mammals (listed or non-listed) is not authorized through the ESA section 7 process. If such take may occur, an incidental take authorization under the Marine Mammal Protection Act (MMPA) section 101 (a)(5) is necessary. For more information regarding MMPA permitting procedures, contact the Permits, Conservation, and Education Division of NMFS Headquarters' Protected Resources Office at (301) 713-2332.

Fishes

The U.S. Distinct Population Segment of smalltooth sawfish was listed as endangered under the ESA on April 1, 2003 (68 FR 15674). Historically, smalltooth sawfish commonly occurred in the shallow waters of the Gulf of Mexico and the eastern seaboard up to North Carolina. Current distribution is believed by Simpfendorfer (2005) to be centered around the extreme southern portion of peninsular Florida (i.e., Everglades National Park including Florida Bay). Recent sawfish records are limited to Georgia, Florida (Simpfendorfer 2005), and most recently, Texas (S. Norton, NMFS, pers. comm.). Notably, the Texas sighting was not verified and may have been either the endangered smalltooth sawfish or the similar largetooth sawfish (*P. perotteti*); records of both are rare throughout the western Gulf of Mexico. Therefore, NMFS believes smalltooth sawfish are rare in the action area and the chances of the proposed action affecting them are discountable. Smalltooth sawfish are not likely to be adversely affected and will not be discussed further in this opinion.

NMFS and the USFWS jointly listed the Gulf sturgeon as a threatened species on September 30, 1991 (56 CFR 49653). The present range of the Gulf sturgeon extends from Lake Pontchartrain and the Pearl River system in Louisiana and Mississippi east to the Suwannee River in Florida. The Gulf sturgeon is an anadromous fish; adults spawn in freshwater then migrate to feed and

[1]Green turtles in U.S. waters are listed as threatened except for the Florida breeding population that is listed as endangered.

grow in estuarine/marine habitats. Gulf sturgeon are bottom feeders; therefore, it is highly unlikely they will come into contact with floating debris associated with the proposed action. Although discarded sea dye packs and flare casings are expected to sink to the ocean bottom, Gulf sturgeon are filter feeders (they take in sand, filter out prey species, then expel the unwanted remains); therefore, NMFS believes the risk is discountable that Gulf sturgeon will ingest the casings if encountered. Since the proposed CSAR training operations are not likely to adversely affect Gulf sturgeon, they will not be considered further in this opinion.

3.2 Listed Species Likely to be Affected

3.2.1 Leatherback Sea Turtle

The leatherback sea turtle was listed as endangered throughout its global range on June 2, 1970. Leatherbacks are widely distributed throughout the oceans of the world and are found in waters of the Atlantic, Pacific, and Indian Oceans (Ernst and Barbour 1972). Leatherback sea turtles are the largest living turtles and range farther than any other sea turtle species. The large size of adult leatherbacks and their tolerance to relatively low temperatures allows them to occur in northern waters such as off Labrador and in the Barents Sea (NMFS and USFWS 1995). Adult leatherbacks forage in temperate and subpolar regions from 71°N to 47°S latitude in all oceans and undergo extensive migrations to and from their tropical nesting beaches. In 1980, the leatherback population was estimated at approximately 115,000 adult females globally (Pritchard 1982). That number, however, is probably an overestimation as it was based on a particularly good nesting year in 1980 (Pritchard 1996). By 1995, the global population of adult females had declined to 34,500 (Spotila et al. 1996). Pritchard (1996) also called into question the population estimates from Spotila et al. (1996) and felt they may be somewhat low because it ended the modeling on data from a particularly bad nesting year (1994) while excluding nesting data from 1995, which was a good nesting year. However, the most recent population estimate for leatherback sea turtles from just the North Atlantic breeding groups is a range of 34,000-90,000 adult individuals (20,000-56,000 adult females) (TEWG 2007).

3.2.1.1 Pacific Ocean

Based on published estimates of nesting female abundance, leatherback populations have collapsed or have been declining at all major Pacific basin nesting beaches for the last two decades (Spotila et al. 1996, NMFS and USFWS 1998c, Sarti et al. 2000, Spotila et al. 2000). For example, the nesting assemblage on Terengganu, Malaysia–which was one of the most significant nesting sites in the western Pacific Ocean–has declined severely from an estimated 3,103 females in 1968 to 2 nesting females in 1994 (Chan and Liew 1996). Nesting assemblages of leatherback turtles are in decline along the coasts of the Solomon Islands, a historically important nesting area (D. Broderick, pers. comm., in Dutton et al. 1999). In Fiji, Thailand, Australia, and Papua New Guinea (East Papua), leatherback turtles have only been known to nest in low densities and scattered colonies.

Only an Indonesian nesting assemblage has remained relatively abundant in the Pacific basin. The largest extant leatherback nesting assemblage in the Indo-Pacific lies on the north Vogelkop coast of Irian Jaya (West Papua), Indonesia, with over 3,000 nests recorded annually

(Putrawidjaja 2000, Suárez et al. 2000). During the early-to-mid 1980s, the number of female leatherback turtles nesting on the two primary beaches of Irian Jaya appeared to be stable. More recently, this population has come under increasing threats that could cause this population to experience a collapse that is similar to what occurred at Terengganu, Malaysia. In 1999, for example, local Indonesian villagers started reporting dramatic declines in sea turtle populations near their villages (Suárez 1999). Unless hatchling and adult turtles on nesting beaches receive more protection, this population will continue to decline. Declines in nesting assemblages of leatherback turtles have been reported throughout the western Pacific region, with nesting assemblages well below abundance levels observed several decades ago (e.g., Suárez 1999).

In the western Pacific Ocean and South China Seas, leatherback turtles are captured, injured, or killed in numerous fisheries, including Japanese longline fisheries. The poaching of eggs, killing of nesting females, human encroachment on nesting beaches, beach erosion, and egg predation by animals also threaten leatherback turtles in the western Pacific.

In the eastern Pacific Ocean, nesting populations of leatherback turtles are declining along the Pacific coast of Mexico and Costa Rica. According to reports from the late 1970s and early 1980s, three beaches on the Pacific coast of Mexico supported as many as half of all leatherback turtle nests for the eastern Pacific. Since the early 1980s, the eastern Pacific Mexican population of adult female leatherback turtles has declined to slightly more than 200 individuals during 1998-1999 and 1999-2000 (Sarti et al. 2000). Spotila et al. (2000) reported the decline of the leatherback turtle population at Playa Grande, Costa Rica, which had been the fourth largest nesting colony in the world. Between 1988 and 1999, the nesting colony declined from 1,367 to 117 female leatherback turtles. Based on their models, Spotila et al. (2000) estimated that the colony could fall to less than 50 females by 2003-2004. Leatherback turtles in the eastern Pacific Ocean are captured, injured, or killed in commercial and artisanal swordfish fisheries off Chile, Columbia, Ecuador, and Peru, and purse seine fisheries for tuna in the eastern tropical Pacific Ocean, and California/Oregon drift gillnet fisheries. Because of the limited data, we cannot provide high-certainty estimates of the number of leatherback turtles captured, injured, or killed through interactions with these fisheries. However, between 8-17 leatherback turtles were estimated to have died annually between 1990 and 2000 in interactions with the California/Oregon drift gillnet fishery; 500 leatherback turtles are estimated to die annually in Chilean and Peruvian fisheries; 200 leatherback turtles are estimated to die in direct harvests in Indonesia; and before 1992 the North Pacific driftnet fisheries for squid, tuna, and billfish captured an estimated 1,000 leatherback turtles each year, killing about 111 of them each year.

Although all causes of the declines in leatherback turtle colonies in the eastern Pacific have not been documented, Sarti et al. (1998) suggest that the declines result from egg poaching, adult and subadult mortalities incidental to high seas fisheries, and natural fluctuations due to changing environmental conditions. Some published reports support this suggestion. Sarti et al. (2000) reported that female leatherback turtles have been killed for meat on nesting beaches like Píedra de Tiacoyunque, Guerrero, Mexico. Eckert (1997) reported that swordfish gillnet fisheries in Peru and Chile contributed to the decline of leatherback turtles in the eastern Pacific. The decline in the nesting population at Mexiquillo, Mexico, occurred at the same time that effort doubled in the Chilean driftnet fishery. In response to these effects, the eastern Pacific population has continued to decline, leading some researchers to conclude that the leatherback is on the verge of extinction in the Pacific Ocean (e.g., Spotila et al. 1996, Spotila et al. 2000). The NMFS assessment of three nesting aggregations in its February 23, 2004, opinion supports this conclusion: If no action is taken to reverse their decline, leatherback sea turtles nesting in the Pacific Ocean either have high risks of extinction in a single human generation (for example, nesting aggregations at Terrenganu and Costa Rica) or they have a high risk of declining to levels where more precipitous declines become almost certain (e.g., Irian Jaya) (NMFS 2004a).

3.2.1.2 Atlantic Ocean

In the Atlantic Ocean, leatherbacks have been recorded as far north as Newfoundland, Canada, and Norway, and as far south as Uruguay, Argentina, and South Africa (NMFS SEFSC 2001). Female leatherbacks nest from the southeastern United States to southern Brazil in the western Atlantic and from Mauritania to Angola in the eastern Atlantic. The most significant nesting beaches in the Atlantic, and perhaps in the world, are in French Guiana and Suriname (NMFS SEFSC 2001). Previous genetic analyses of leatherbacks using only mitochondrial DNA (mtDNA) resulted in an earlier determination that within the Atlantic basin there are at least three genetically different nesting populations: the St. Croix nesting population (U.S. Virgin Islands), the mainland nesting Caribbean population (Florida, Costa Rica, Suriname/French Guiana), and the Trinidad nesting population (Dutton et al. 1999). Further genetic analyses using microsatellite markers in nuclear DNA along with the mtDNA data and tagging data has resulted in Atlantic Ocean leatherbacks now being divided into seven groups or breeding populations: Florida, Northern Caribbean, Western Caribbean, Southern Caribbean/Guianas, West Africa, South Africa, and Brazil (TEWG 2007). When the hatchlings leave the nesting beaches, they move offshore but eventually utilize both coastal and pelagic waters. Very little is known about the pelagic habits of the hatchlings and juveniles, and they have not been documented to be associated with the *Sargassum* areas as are other species. Leatherbacks are deep divers, with recorded dives to depths in excess of 1,000 m (Eckert et al. 1989, Hayes et al. 2004).

Life History and Distribution
Leatherbacks are a long-lived species, living for well over 30 years. It has been thought that they reach sexual maturity somewhat faster than other sea turtles (except Kemp's ridley), with an estimated range from 3-6 years (Rhodin 1985) to 13-14 years (Zug and Parham 1996). However, some recent research using sophisticated methods of analyzing leatherback ossicles has cast doubt on the previously accepted age to maturity figures, with leatherbacks in the western North Atlantic possibly not reaching sexual maturity until as late as 29 years of age (Avens and Goshe 2007). Continued research in this area is vitally important to understanding the life history of leatherbacks and has important implications in management of the species.

Female leatherbacks nest frequently (up to 10 nests per year) during a nesting season and nest about every 2-3 years. During each nesting, they produce 100 eggs or more in each clutch and, thus, can produce 700 eggs or more per nesting season (Schultz 1975). However, a significant portion (up to approximately 30 percent) of the eggs can be infertile. Thus, the actual proportion of eggs that can result in hatchlings is less than this seasonal estimate. The eggs incubate for 55-75 days before hatching. Based on a review of all sightings of leatherback sea turtles of <145 cm curved carapace length (ccl), Eckert (1999) found that leatherback juveniles remain in waters warmer than 26°C until they exceed 100 ccl.

Although leatherbacks are the most pelagic of the sea turtles, they enter coastal waters on an irregular basis to feed in areas where jellyfish are concentrated. Leatherback sea turtles feed primarily on cnidarians (medusae, siphonophores) and tunicates.

Evidence from tag returns and strandings in the western Atlantic suggests that adult leatherback sea turtles engage in routine migrations between boreal, temperate, and tropical waters (NMFS and USFWS 1992). A 1979 aerial survey of the outer continental shelf from Cape Hatteras, North Carolina, to Cape Sable, Nova Scotia, showed leatherbacks to be present throughout the area with the most numerous sightings made from the Gulf of Maine south to Long Island. Leatherbacks were sighted in waters where depths ranged from 1 to 4,151 m, but 84.4 percent of sightings were in areas where the water was less than 180 m deep (Shoop and Kenney 1992). Leatherbacks were sighted in waters of a similar sea surface temperature as loggerheads from 7°C to 27.2°C (Shoop and Kenney 1992). However, this species appears to have a greater tolerance for colder waters because more leatherbacks were found at the lower temperatures (Shoop and Kenney 1992). This aerial survey estimated the in-water leatherback population from near Nova Scotia, Canada, to Cape Hatteras, North Carolina, at approximately 300-600 animals.

General differences in migration patterns and foraging grounds may occur between the seven nesting assemblages, but data is limited. Per TEWG (2007):

> Marked or satellite tracked turtles from the Florida and North Caribbean assemblages have been re-sighted off North America, in the Gulf of Mexico and along the Atlantic coast and a few have moved to western Africa, north of the equator. In contrast, Western Caribbean and Southern Caribbean/Guianas animals have been found more commonly in the eastern Atlantic, off Europe and northern Africa, as well as along the North American coast. There are no reports of marked animals from the Western North Atlantic assemblages entering the Mediterranean Sea or the South Atlantic Ocean, though in the case of the Mediterranean this may be due more to a lack of data rather than failure of Western North Atlantic turtles moving into the Sea. The tagging data coupled with the satellite telemetry data indicate that animals from the western North Atlantic nesting subpopulations use virtually the entire North Atlantic Ocean. In the South Atlantic Ocean, tracking and tag return data follow three primary patterns. Although telemetry data from the West African nesting assemblage showed that all but one remained on the shallow continental shelf, there clearly is movement to foraging areas of the south coast of Brazil and Argentina. There is also a small nesting aggregation of leatherbacks in Brazil, and while data are limited to a few satellite tracks, these turtles seem to remain in the southwest Atlantic foraging along the continental shelf margin as far south as Argentina. South African nesting turtles apparently forage primarily south, around the tip of the continent.

Population Dynamics and Status

The status of the Atlantic leatherback population has been less clear than the Pacific population. This uncertainty has been a result of inconsistent beach and aerial surveys, cycles of erosion and reformation of nesting beaches in the Guianas (representing the largest nesting area), a lesser degree of nest-site fidelity than occurs with the hardshell sea turtle species, and inconsistencies in the availability and analyses of data. However, recent coordinated efforts at data collection and analyses by the Leatherback Turtle Expert Working Group have helped to clarify the understanding of the Atlantic population status (TEWG 2007).

The Southern Caribbean/Guianas stock is the largest known Atlantic leatherback nesting aggregation (TEWG 2007). This area includes the Guianas (Guyana, Suriname, and French Guiana), Trinidad, Dominica, and Venezuela, with the vast majority of the nesting occurring in the Guianas and Trinidad. Past analyses had shown that the nesting aggregation in French Guiana had been declining at about 15 percent per year since 1987 (NMFS SEFSC 2001). However, from 1979-1986, the number of nests was increasing at about 15 percent annually, which could mean that the current decline could be part of a nesting cycle that coincides with the erosion cycle of Guiana beaches described by Schultz (1975). It is thought that the cycle of erosion and reformation of beaches has resulted in shifting nesting beaches throughout this region. This was supported by the increased nesting seen in Suriname, where leatherback nest numbers have shown large recent increases concurrent with declines elsewhere (with more than 10,000 nests per year since 1999 and a peak of 30,000 nests in 2001), and the long-term trend for the overall Suriname and French Guiana population was thought to possibly show an increase (Girondot 2002 in Hilterman and Goverse 2003). In the past, many sea turtle scientists have agreed that the Guianas (and some would include Trinidad) should be viewed as one population and that a synoptic evaluation of nesting at all beaches in the region is necessary to develop a true picture of population status (Reichart et al. 2001). Genetics studies have added support to this notion and have resulted in the designation of the Southern Caribbean/Guianas stock. Using both Bayesian modeling and regression analyses, the TEWG (2007) determined that the Southern Caribbean/Guianas stock had demonstrated a long-term, positive population growth rate (using nesting females as a proxy for population). This positive growth was seen within major nesting areas for the stock, including Trinidad, Guyana, and the combined beaches of Suriname and French Guiana (TEWG 2007).

The Western Caribbean stock includes nesting beaches from Honduras to Colombia. The most intense nesting in that area occurs in Costa Rica, Panama, and the Gulf of Uraba in Colombia (Duque et al. 2000). The Caribbean coast of Costa Rica and extending through Chiriquí Beach, Panama, represents the fourth largest known leatherback rookery in the world (Troëng et al. 2004). Examination of data from three index nesting beaches in the region (Tortuguero, Gandoca, and Pacuare in Costa Rica) using various Bayesian and regression analyses indicated that the nesting population likely was not growing over the 1995-2005 time series of available data (TEWG 2007), though modeling of the nesting data for Tortuguero indicates a possible 67.8 percent decline between 1995 and 2006 (Troëng et al. 2007).

Nesting data for the Northern Caribbean stock is available from Puerto Rico, the U.S. Virgin Islands (St. Croix), and the British Virgin Islands (Tortola). In Puerto Rico, the primary nesting beaches are at Fajardo and on the island of Culebra. Nesting between 1978 and 2005 has ranged between 469-882 nests, and the population has been growing since 1978, with an overall annual growth rate of 1.1 percent (TEWG 2007). At the primary nesting beach on St. Croix, the Sandy Point National Wildlife Refuge, nesting has fluctuated from a few hundred nests to a high of 1,008 in 2001, and the average annual growth rate has been approximately 1.1 percent from 1986-2004 (TEWG 2007). Nesting in Tortola is limited, but has been increasing from 0-6 nests per year in the late 1980s to 35-65 per year in the 2000s, with an annual growth rate of approximately 1.2 percent between 1994 and 2004 (TEWG 2007).

The Florida nesting stock nests primarily along the east coast of Florida. This stock is of growing importance, with total nests between 800-900 per year in the 2000s following nesting totals fewer than 100 nests per year in the 1980s (Florida Fish and Wildlife Conservation Commission, unpublished data). Using data from the index nesting beach surveys, the TEWG (2007) estimated a significant annual nesting growth rate of 1.17 percent between 1989 and 2005. In 2007, a record 517 leatherback nests were observed on the index beaches in Florida, with 265 in 2008 (FWC Index Nesting Beach database). The reduction in nesting from 2007 to 2008 is thought to be a result of the cyclical nature of leatherback nesting, similar to the biennial cycle of green turtle nesting.

The West African nesting stock of leatherbacks is a large, important, but mostly unstudied aggregation. Nesting occurs in various countries along Africa's Atlantic coast, but much of the nesting is undocumented and the data are inconsistent. However, it is known that Gabon has a very large amount of leatherback nesting, with at least 30,000 nests laid along its coast in one season (Fretey et al. in press). Fretey et al. (in press) also provide detailed information about other known nesting beaches and survey efforts along the Atlantic African coast. Because of the lack of consistent effort and minimal available data, trend analyses were not possible for this stock (TEWG 2007).

Two other small but growing nesting stocks utilize the beaches of Brazil and South Africa. For the Brazilian stock, the TEWG (2007) analyzed the available data and determined that between 1988 and 2003 there was a positive annual average growth rate of 1.07 percent using regression analyses and 1.08 percent using Bayesian modeling. The South African stock has an annual average growth rate of 1.06 based on regression modeling and 1.04 percent using the Bayesian approach (TEWG 2007).

Estimates of total population size for Atlantic leatherbacks are difficult to ascertain due to the inconsistent nature of the available nesting data. In 1996, the entire Western Atlantic population was characterized as stable at best (Spotila et al. 1996), with numbers of nesting females reported to be on the order of 18,800. A subsequent analysis by Spotila (pers. comm.) indicated that by 2000, the Western Atlantic nesting population had decreased to about 15,000 nesting females. Spotila et al. (1996) estimated that the leatherback population for the entire Atlantic basin, including all nesting beaches in the Americas, the Caribbean, and West Africa, totaled approximately 27,600 nesting females, with an estimated range of 20,082-35,133. This is consistent with the estimate of 34,000-95,000 total adults (20,000-56,000 adult females; 10,000-21,000 nesting females) determined by the TEWG (2007).

Threats

Zug and Parham (1996) pointed out that the main threat to leatherback populations in the Atlantic is the combination of fishery-related mortality (especially entanglement in gear and drowning in trawls) and the intense egg harvesting on the main nesting beaches. Other important ongoing threats to the population include pollution, loss of nesting habitat, and boat strikes.

Of sea turtle species, leatherbacks seem to be the most vulnerable to entanglement in fishing gear. This susceptibility may be the result of their body type (large size, long pectoral flippers, and lack of a hard shell), their attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, possibly their method of locomotion, and perhaps their attraction to the lightsticks used to attract target species in longline fisheries. They are also susceptible to entanglement in gillnets and pot/trap lines (used in various fisheries) and capture in trawl gear (e.g., shrimp trawls).

Leatherbacks are exposed to pelagic longline fisheries in many areas of their range. Unlike loggerhead turtle interactions with longline gear, leatherback turtles do not usually ingest longline bait. Instead, leatherbacks are typically foul-hooked by longline gear (e.g., on the flipper or shoulder area) rather than getting mouth-hooked or swallowing the hook (NMFS SEFSC 2001). A total of 24 nations, including the United States (accounting for 5-8 percent of the hooks fished), have fleets participating in pelagic longline fisheries in the area. Basin-wide, Lewison et al. (2004) estimated that 30,000-60,000 leatherback sea turtle captures occurred in Atlantic pelagic longline fisheries in the year 2000 alone (note that multiple captures of the same individual are known to occur, so the actual number of individuals captured may not be as high). Genetic studies performed within the Northeast Distant Fishery Experiment indicate that the leatherbacks captured in the Atlantic highly migratory species pelagic longline fishery were primarily from the French Guiana and Trinidad nesting stocks (over 95 percent); individuals from West African stocks were surprisingly absent (Roden et al. in press).

Leatherbacks are also susceptible to entanglement in the lines associated with trap/pot gear used in several fisheries. From 1990-2000, 92 entangled leatherbacks were reported from New York through Maine (Dwyer et al. 2002). Additional leatherbacks stranded wrapped in line of unknown origin or with evidence of a past entanglement (Dwyer et al. 2002). Fixed gear fisheries in the mid-Atlantic have also contributed to leatherback entanglements. In North Carolina, two leatherback sea turtles were reported entangled in a crab pot buoy inside Hatteras Inlet (D. Fletcher, pers. comm. to S. Epperly in NMFS SEFSC 2001). A third leatherback was reported entangled in a crab pot buoy in Pamlico Sound near Ocracoke. This turtle was disentangled and released alive; however, lacerations on the front flippers from the lines were evident (D. Fletcher, pers. comm. to S. Epperly in NMFS SEFSC 2001). In the Southeast, leatherbacks are vulnerable to entanglement in Florida's lobster pot and stone crab fisheries. In the U.S. Virgin Islands, where one of five leatherback strandings from 1982 to 1997 was due to entanglement (Boulon 2000), leatherbacks have been observed with their flippers wrapped in the line of West Indian fish traps (R. Boulon, pers. comm. to J. Braun-McNeill in NMFS SEFSC 2001). Because many entanglements of this typically pelagic species likely go unnoticed, entanglements in fishing gear may be much higher.

Leatherback interactions with the Southeast Atlantic shrimp fishery, which operates predominately from North Carolina through southeast Florida (NMFS 2002a), have also been a common occurrence. Leatherbacks, which migrate north annually, are likely to encounter shrimp trawls working in the coastal waters off the Atlantic coast from Cape Canaveral, Florida, to the Virginia/North Carolina border. Leatherbacks also interact with the Gulf of Mexico shrimp fishery. For many years, TEDs required for use in these fisheries were less effective at excluding leatherbacks than the smaller, hard-shelled turtle species. To address this problem, on February 21, 2003, the NMFS issued a final rule to amend the TED regulations. Modifications to the design of TEDs are now required in order to exclude leatherbacks and large and sexually mature loggerhead and green turtles.

Other trawl fisheries are also known to interact with leatherback sea turtles. In October 2001, a Northeast Fisheries Science Center (NEFSC) observer documented the take of a leatherback in a bottom otter trawl fishing for *Loligo* squid off Delaware; TEDs are not required in this fishery. The winter trawl flounder fishery, which did not come under the revised TED regulations, may also interact with leatherback sea turtles.

Gillnet fisheries operating in the nearshore waters of the mid-Atlantic states are also suspected of capturing, injuring, and/or killing leatherbacks when these fisheries and leatherbacks co-occur. Data collected by the NEFSC Fisheries Observer Program from 1994 through 1998 (excluding 1997) indicate that a total of 37 leatherbacks were incidentally captured (16 lethally) in drift gillnets set in offshore waters from Maine to Florida during this period. Observer coverage for this period ranged from 54 to 92 percent.

Poaching is not known to be a problem for nesting populations in the continental United States. However, in 2001 the NMFS Southeast Fisheries Science Center (SEFSC) noted that poaching of juveniles and adults was still occurring in the U.S. Virgin Islands and the Guianas. In all, four of the five strandings in St. Croix were the result of poaching (Boulon 2000). A few cases of fishermen poaching leatherbacks have been reported from Puerto Rico, but most of the poaching is on eggs.

Leatherback sea turtles may be more susceptible to marine debris ingestion than other species due to their pelagic existence and the tendency of floating debris to concentrate in convergence zones that adults and juveniles use for feeding areas and migratory routes (Lutcavage et al. 1997, Shoop and Kenney 1992). Investigations of the stomach contents of leatherback sea turtles revealed that a substantial percentage (44 percent of the 16 cases examined) contained plastic (Mrosovsky 1981). Along the coast of Peru, intestinal contents of 19 of 140 (13 percent) leatherback carcasses were found to contain plastic bags and film (Fritts 1982). The presence of plastic debris in the digestive tract suggests that leatherbacks might not be able to distinguish between prey items and plastic debris (Mrosovsky 1981). Balazs (1985) speculated that the object might resemble a food item by its shape, color, size, or even movement as it drifts about, and induce a feeding response in leatherbacks.

It is important to note that, like marine debris, fishing gear interactions and poaching are problems for leatherbacks throughout their range. Entanglements are common in Canadian waters where Goff and Lien (1988) reported that 14 of 20 leatherbacks encountered off the coast of Newfoundland/Labrador were entangled in fishing gear including salmon net, herring net, gillnet, trawl line and crab pot line. Leatherbacks are reported taken by many other nations that participate in Atlantic pelagic longline fisheries, including Taipei, Brazil, Trinidad, Morocco, Cyprus, Venezuela, Korea, Mexico, Cuba, U.K., Bermuda, People's Republic of China, Grenada, Canada, Belize, France, and Ireland (see NMFS SEFSC 2001 for a description of take records). Leatherbacks are known to drown in fish nets set in coastal waters of Sao Tome, West Africa (Castroviejo et al. 1994, Graff 1995). Gillnets are one of the suspected causes of the decline in the leatherback sea turtle population in French Guiana (Chevalier et al. 1999), and gillnets targeting green and hawksbill turtles in the waters of coastal Nicaragua also incidentally catch leatherback turtles (Lageux et al. 1998). Observers on shrimp trawlers operating in the northeastern region of Venezuela documented the capture of six leatherbacks from 13,600 trawls (Marcano and Alio-M. 2000). A study by the Trinidad and Tobago's Institute for Marine Affairs (IMA) in 2002 confirmed that bycatch of leatherbacks is high in Trinidad. IMA estimated that more than 3,000 leatherbacks were captured incidental to gillnet fishing in the coastal waters of Trinidad in 2000. As much as one-half or more of the gravid turtles in Trinidad and Tobago waters may be killed (Lee Lum 2003). However, many of the turtles do not die as a result of drowning, but rather because the fishermen butcher them in order to get them out of their nets (NMFS SEFSC 2001).

There is a large and growing body of literature on past, present, and future impacts of global climate change induced by human activities, i.e., global warming. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. The Environmental Protection Agency's climate change Web page provides basic background information on these and other measured or anticipated effects (see www.epa.gov/climatechange/index.html). However, the impacts on sea turtles currently cannot, for the most part, be predicted with any degree of certainty. Leatherback sea turtles, however, are speculated to be the most capable of coping with climate change because they have the widest geographical distribution of any sea turtle and show relatively weak beach nesting site fidelity (Dutton et al. 1999).

The Intergovernmental Panel on Climate Change has stated that global climate change is unequivocal (IPCC 2007) and its impacts may alter the hatchling sex ratios of leatherback sea turtles (Mrosovsky et al. 1984, Hawkes et al. 2007, NMFS and USFWS 2007d). In marine turtles, sex is determined by temperature in the middle third of incubation with female offspring produced at higher temperatures and males at lower temperatures within a thermal tolerance range of 25°-35°C (Ackerman 1997). However, unlike other sea turtles species, leatherbacks tend to select nest locations in the cooler tidal zone of beaches (Kamel and Mrosovsky 2003). This preference may help mitigate the effects from increased beach temperature (Kamel and Mrosovsky 2003).

Sea level rise from global climate change (IPCC 2007) is also a potential problem, particularly for areas with low-lying beaches where sand depth is a limiting factor, as the sea may inundate nesting sites and decrease available nesting habitat (Daniels et al. 1993, Fish et al. 2005, Baker et al. 2006). The loss of habitat as a result of climate change could be accelerated due to a combination of other environmental and oceanographic changes such as increase in the frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis et al. 2006, Baker et al. 2006).

Global climate change is likely to influence the distribution and abundance of jellyfish, the primary prey item of leatherbacks (NMFS and USFWS 2007d). Several studies have shown leatherback distribution is influenced by jellyfish abundance (e.g., Houghton et al. 2006, Witt et al. 2006, Witt et al. 2007). How these changes in jellyfish abundance and distribution will impact leatherback sea turtle foraging behavior and distribution is currently unclear (Witt et al. 2007).

3.2.1.3 Summary of Leatherback Status

In the Pacific Ocean, the abundance of leatherback turtle nesting individuals and colonies has declined dramatically over the past 10 to 20 years. Nesting colonies throughout the Eastern and Western Pacific Ocean have been reduced to a fraction of their former abundance by the combined effects of human activities that have reduced the number of nesting females. In addition, egg poaching has reduced the reproductive success of the remaining nesting females. At current rates of decline, leatherback turtles in the Pacific basin are a critically endangered species with a low probability of surviving and recovering in the wild.

In the Atlantic Ocean, our understanding of the status and trends of leatherback turtles is somewhat more confounded, although the overall trend appears to be stable to increasing. The data indicate increasing or stable nesting populations in all of the regions except West Africa (no long-term data are available) and the Western Caribbean (TEWG 2007). Some of the same factors that led to precipitous declines of leatherbacks in the Pacific also affect leatherbacks in the Atlantic (i.e., leatherbacks are captured and killed in many kinds of fishing gear and interact with fisheries in state, federal, and international waters). Poaching is also a problem that affects leatherbacks occurring in U.S. waters. Leatherbacks are also more susceptible to death or injury from ingesting marine debris than other turtle species.

3.2.2 Hawksbill Sea Turtle

The hawksbill turtle was listed as endangered under the precursor of the ESA on June 2, 1970, and is considered critically endangered by the International Union for the Conservation of Nature (IUCN). The hawksbill is a medium-sized sea turtle, with adults in the Caribbean ranging in size from approximately 62.5 to 94.0 cm straight carapace length. The species occurs in all ocean basins, although it is relatively rare in the Eastern Atlantic and Eastern Pacific, and absent from the Mediterranean Sea. Hawksbills are the most tropical sea turtle species, ranging from approximately 30°N latitude to 30°S latitude. They are closely associated with coral reefs and other hardbottom habitats, but they are also found in other habitats including inlets, bays, and coastal lagoons (NMFS and USFWS 1993). There are only five remaining regional nesting populations with more than 1,000 females nesting annually. These populations are in the Seychelles, Mexico, Indonesia, and two in Australia (Meylan and Donnelly 1999). There has been a global population decline of over 80 percent during the last three generations (105 years) (Meylan and Donnelly 1999).

3.2.2.1 Pacific Ocean

Anecdotal reports throughout the Pacific indicate the current Pacific hawksbill population is well below historical levels (NMFS 2004a). It is believed that this species is rapidly approaching extinction in the Pacific because of harvesting for its meat, shell, and eggs as well as destruction of nesting habitat (NMFS 2004a). Hawksbill sea turtles nest in the Hawaiian Islands as well as the islands and mainland of Southeast Asia, from China to Japan, and throughout the Philippines, Malaysia, Indonesia, Papua New Guinea, the Solomon Islands, and Australia (NMFS 2004a). However, along the eastern Pacific Rim where nesting was common in the 1930s, hawksbills are now rare or absent (Cliffton et al. 1982, NMFS 2004a).

3.2.2.2 Atlantic Ocean

In the western Atlantic, the largest hawksbill nesting population occurs on the Yucatán Peninsula of Mexico (Garduño-Andrade et al. 1999). With respect to the United States, nesting occurs in Puerto Rico, the U.S. Virgin Islands, and along the southeast coast of Florida. Nesting also occurs outside of the United States and its territories, in Antigua, Barbados, Costa Rica, Cuba, and Jamaica (Meylan 1999a). Outside of the nesting areas, hawksbills have been seen off the U.S. Gulf of Mexico states and along the Eastern Seaboard as far north as Massachusetts, although sightings north of Florida are rare (NMFS and USFWS 1993).

Life History and Distribution

The best estimate of age at sexual maturity for hawksbill sea turtles is about 20-40 years (Chaloupka and Limpus 1997, Crouse 1999a). Reproductive females undertake periodic (usually non-annual) migrations to their natal beach to nest. Movements of reproductive males are less well known, but are presumed to involve migrations to their nesting beach or to courtship stations along the migratory corridor (Meylan 1999b). Females nest an average of 3-5 times per season (Meylan and Donnelly 1999, Richardson et al. 1999). Clutch size is larger on average (up to 250 eggs) than that of other sea turtles (Hirth 1980). Reproductive females may exhibit a high degree of fidelity to their nest sites.

The life history of hawksbills consists of a pelagic stage that lasts from the time they leave the nesting beach as hatchlings until they are approximately 22-25 cm in straight carapace length (Meylan 1988, Meylan and Donnelly 1999), followed by residency in developmental habitats (foraging areas where juveniles reside and grow) in coastal waters. Adult foraging habitat, which may or may not overlap with developmental habitat, is typically coral reefs, although other hard-bottom communities and occasionally mangrove-fringed bays may be occupied. Hawksbills show fidelity to their foraging areas over several years (van Dam and Díez 1998).

The hawksbill's diet is highly specialized and consists primarily of sponges (Meylan 1988). Other food items, notably corallimorphs and zooanthids, have been documented to be important in some areas of the Caribbean (van Dam and Díez 1997, Mayor et al. 1998, León and Díez 2000).

Population Dynamics and Status
Nesting within the southeastern United States and U.S. Caribbean is restricted to Puerto Rico (>650 nests/yr), the U.S. Virgin Islands (~400 nests/yr), and, rarely, Florida (0-4 nests/yr) (Eckert 1995, Meylan 1999a, Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute's Statewide Nesting Beach Survey data 2002). At the two principal nesting beaches in the U.S. Caribbean where long-term monitoring has been carried out, populations appear to be increasing (Mona Island, Puerto Rico) or stable (Buck Island Reef National Monument, St. Croix, USVI) (Meylan 1999a).

Threats
As with other sea turtle species, hawksbill sea turtles are affected by habitat loss, habitat degradation, marine pollution, marine debris, fishery interactions, and poaching in some parts of their range. A complete list of other indirect factors can be found in NMFS SEFSC (2001). There continues to be a black market for hawksbill shell products ("tortoiseshell"), which likely contributes to the harvest of this species.

There is a large and growing body of literature on past, present, and future impacts of global climate change induced by human activities, i.e., global warming. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. The Environmental Protection Agency's climate change Web page provides basic background information on these and other measured or anticipated effects (see www.epa.gov/climatechange/index.html). However, the impacts on sea turtles currently cannot, for the most part, be predicted with any degree of certainty.

The Intergovernmental Panel on Climate Change has stated that global climate change is unequivocal (IPCC 2007) and its impacts may impact the hatchling sex ratios of hawksbill sea turtles (NMFS and USFWS 2007b). In marine turtles, sex is determined by temperature in the middle third of incubation with female offspring produced at higher temperatures and males at lower temperatures within a thermal tolerance range of 25°-35°C (Ackerman 1997). Increases in global temperature could potentially skew future sex ratios toward a higher numbers of females (NMFS and USFWS 2007b).

The effects from increased temperatures may be exacerbated on developed nesting beaches where shoreline armoring and construction has denuded vegetation. Sea level rise from global climate change (IPCC 2007) is also a potential problem, particularly for areas with low-lying beaches where sand depth is a limiting factor, as the sea may inundate nesting sites and decrease available nesting habitat (Daniels et al. 1993, Fish et al. 2005, Baker et al. 2006). The loss of habitat as a result of climate change could be accelerated due to a combination of other environmental and oceanographic changes such as increased frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis et al. 2006, Baker et al. 2006).

Other changes in the marine ecosystem caused by global climate change (e.g., salinity, oceanic currents, dissolved oxygen levels, nutrient distribution, etc.) could influence the distribution and abundance of phytoplankton, zooplankton, submerged aquatic vegetation, coral reefs, forage fish, etc. Since hawksbills are typically associated with coral reef ecosystems, increases in global temperatures leading to coral death (Sheppard 2006) could adversely affect the foraging habitats of this species.

3.2.2.3 Summary of Status for Hawksbill Sea Turtles

Worldwide, hawksbill sea turtle populations are declining. They face many of the same threats affecting other sea turtle species. In addition, there continues to be a commercial market for hawksbill shell products, despite protections afforded to the species under U.S. law and international conventions.

3.2.3 Kemp's Ridley Sea Turtle

The Kemp's ridley was listed as endangered on December 2, 1970. Internationally, the Kemp's ridley is considered the most endangered sea turtle (Zwinenberg 1977, Groombridge 1982, TEWG 2000). Kemp's ridleys nest primarily at Rancho Nuevo, a stretch of beach in Mexico's Tamaulipas State. This species occurs mainly in coastal areas of the Gulf of Mexico and the northwestern Atlantic Ocean. Occasional individuals reach European waters (Brongersma 1972). Adults of this species are usually confined to the Gulf of Mexico, although adult-sized individuals sometimes are found on the east coast of the United States.

Life History and Distribution
The TEWG (1998) estimates age at maturity from 7-15 years. Females return to their nesting beach about every 2 years (TEWG 1998). Nesting occurs from April into July and is essentially limited to the beaches of the western Gulf of Mexico, near Rancho Nuevo in southern Tamaulipas, Mexico. The mean clutch size for Kemp's ridleys is 100 eggs/nest, with an average of 2.5 nests/female/season.

Little is known of the movements of the post-hatchling stage (pelagic stage) within the Gulf of Mexico. Studies have shown the post-hatchling pelagic stage varies from 1-4 or more years, and the benthic immature stage lasts 7-9 years (Schmid and Witzell 1997). Benthic immature Kemp's ridleys have been found along the Eastern Seaboard of the United States and in the Gulf of Mexico. Atlantic benthic immature sea turtles travel northward as the water warms to feed in the productive, coastal waters off Georgia through New England, returning southward with the onset of winter (Lutcavage and Musick 1985, Henwood and Ogren 1987, Ogren 1989). Studies suggest that benthic immature Kemp's ridleys stay in shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida coast (Renaud 1995).

Stomach contents of Kemp's ridleys along the lower Texas coast consisted of nearshore crabs and mollusks, as well as fish, shrimp, and other foods considered to be shrimp fishery discards (Shaver 1991). A 2005 dietary study of immature Kemp's ridleys off southwest Florida documented predation on benthic tunicates, a previously undocumented food source for this species (Witzell and Schmid 2005). These pelagic stage Kemp's ridleys presumably feed on the available *Sargassum* and associated infauna or other epipelagic species found in the Gulf of Mexico.

Population Dynamics and Status

Of the seven extant species of sea turtles in the world, the Kemp's ridley has declined to the lowest population level. Most of the population of adult females nest on the Rancho Nuevo beaches (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the mid-1980s nesting numbers were below 1,000 (with a low of 702 nests in 1985). However, observations of increased nesting (with 6,277 nests recorded in 2000) suggest that the decline in the ridley population has stopped and the population is now increasing (USFWS 2000). The number of nests observed at Rancho Nuevo and nearby beaches increased at a mean rate of 11.3 percent per year from 1985 to 1999 (TEWG 2000). These trends are further supported by 2004-2007 nesting data from Mexico. The number of nests over that period has increased from 7,147 in 2004, to 10,099 in 2005, to 12,143 in 2006, and 15,032 during the 2007 nesting season (Gladys Porter Zoo 2007). An unofficial estimate for 2008 stands at 17,882 nests (S. Epperly, NMFS, SEFSC, pers. comm.). A small nesting population is also emerging in the United States, primarily in Texas, rising from 6 nests in 1996 to 128 in 2007, and a record 195 in 2008 (National Park Service data).

A period of steady increase in benthic immature ridleys has been occurring since 1990 and appears to be due to increased hatchling production and an apparent increase in survival rates of immature sea turtles beginning in 1990. The increased survivorship of immature sea turtles is attributable, in part, to the introduction of TEDs in the United States' and Mexico's shrimping fleets. As demonstrated by nesting increases at the main nesting sites in Mexico, adult ridley numbers have increased over the last decade. The population model used by TEWG (2000) projected that Kemp's ridleys could reach the recovery plan's intermediate recovery goal of 10,000 nesters by the year 2015. Recent calculations of nesting females determined from nest counts show that the population trend is increasing towards that recovery goal, with an estimate of 4,047 nesters in 2006 and 5,500 in 2007 (NMFS 2007c, Gladys Porter Zoo 2007).

Next to loggerheads, Kemp's ridleys are the second most abundant sea turtle in Virginia and Maryland waters, arriving in these areas during May and June (Keinath et al. 1987, Musick and Limpus 1997). The juvenile population of Kemp's ridley sea turtles in Chesapeake Bay is estimated to be 211 to 1,083 sea turtles (Musick and Limpus 1997). These juveniles frequently forage in submerged aquatic grass beds for crabs (Musick and Limpus 1997). Kemp's ridleys consume a variety of crab species, including *Callinectes* spp., *Ovalipes* spp., *Libinia* spp., and *Cancer* spp. Mollusks, shrimp, and fish are consumed less frequently (Bjorndal 1997). Upon leaving Chesapeake Bay in autumn, juvenile Kemp's ridleys migrate down the coast, passing Cape Hatteras in December and January (Musick and Limpus 1997). These larger juveniles are joined there by juveniles of the same size from North Carolina sounds and smaller juveniles from New York and New England to form one of the densest concentrations of Kemp's ridleys outside of the Gulf of Mexico (Musick and Limpus 1997, Epperly et al. 1995a, Epperly et al. 1995b).

Threats

Kemp's ridleys face many of the same threats as other sea turtle species, including destruction of nesting habitat from storm events, natural predators at sea, and oceanic events such as cold-stunning. Although cold-stunning can occur throughout the range of the species, it may be a greater risk for sea turtles that utilize the more northern habitats of Cape Cod Bay and Long

Island Sound. For example, in the winter of 1999-2000, there was a major cold-stunning event where 218 Kemp's ridleys, 54 loggerheads, and 5 green sea turtles were found on Cape Cod beaches (R. Prescott, NMFS, pers. comm. 2001). Annual cold-stunning events do not always occur at this magnitude; the extent of episodic major cold-stun events may be associated with numbers of sea turtles utilizing Northeast waters in a given year, oceanographic conditions, and the occurrence of storm events in the late fall. Many cold-stunned sea turtles can survive if found early enough, but cold-stunning events can still represent a significant cause of natural mortality. A complete list of other indirect factors can be found in NMFS SEFSC (2001).

Although changes in the use of shrimp trawls and other trawl gear have helped to reduce mortality of Kemp's ridleys, this species is also affected by other sources of anthropogenic impacts similar to those discussed in previous sections. For example, in the spring of 2000, a total of 5 Kemp's ridley carcasses were recovered from the same North Carolina beaches where 275 loggerhead carcasses were found. Cause of death for most of the sea turtles recovered was unknown, but the mass mortality event was suspected to have been from a large-mesh gillnet fishery operating offshore in the preceding weeks. The 5 Kemp's ridley carcasses that were found are likely to have been only a minimum count of the number of Kemp's ridleys that were killed or seriously injured as a result of the fishery interaction because it is unlikely that all of the carcasses washed ashore.

There is a large and growing body of literature on past, present, and future impacts of global climate change induced by human activities, i.e., global warming. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. The Environmental Protection Agency's climate change Web page provides basic background information on these and other measured or anticipated effects (see www.epa.gov/climatechange/index.html). However, the impacts on sea turtles currently cannot, for the most part, be predicted with any degree of certainty.

The Intergovernmental Panel on Climate Change has stated that global climate change is unequivocal (IPCC 2007) and its impacts may be significant to the hatchling sex ratios of Kemp's ridley sea turtles (Wibbels 2003, NMFS and USFWS 2007c). In marine turtles, sex is determined by temperature in the middle third of incubation with female offspring produced at higher temperatures and males at lower temperatures within a thermal tolerance range of 25°-35°C (Ackerman 1997). Increases in global temperature could potentially skew future sex ratios toward a higher numbers of females (NMFS and USFWS 2007c).

The effects from increased temperatures may be exacerbated on developed nesting beaches where shoreline armoring and construction has denuded vegetation. Sea level rise from global climate change (IPCC 2007) is also a potential problem, particularly for areas with low-lying beaches where sand depth is a limiting factor, as the sea may inundate nesting sites and decrease available nesting habitat (Daniels et al. 1993, Fish et al. 2005, Baker et al. 2006). The loss of habitat as a result of climate change could be accelerated due to a combination of other environmental and oceanographic changes such as increased frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis et al. 2006, Baker et al. 2006).

Other changes in the marine ecosystem caused by global climate change (e.g., salinity, oceanic currents, dissolved oxygen levels, nutrient distribution, etc.) could influence the distribution and abundance of phytoplankton, zooplankton, submerged aquatic vegetation, forage fish, etc., which could ultimately affect the primary foraging areas of Kemp's ridley sea turtles.

3.2.3.1 Summary of Kemp's Ridley Status

The only major nesting site for Kemp's ridleys is a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963). The number of nests observed at Rancho Nuevo and nearby beaches increased from 1985 to 2008. Nesting has also exceeded 12,000 nests per year from 2004-2008 (Gladys Porter Zoo database). Kemp's ridleys mature at an earlier age (7-15 years) than other chelonids; thus, "lag effects" as a result of unknown impacts to the non-breeding life stages would likely have been seen in the increasing nest trend beginning in 1985 (USFWS and NMFS 1992).

The largest contributors to the decline of Kemp's ridleys in the past were commercial and local exploitation, especially poaching of nests at the Rancho Nuevo site, as well as the Gulf of Mexico trawl fisheries. The advent of TED regulations for trawlers and protections for the nesting beaches has allowed the species to begin to recover. Many threats to the future of the species remain, including interactions with fishery gear, marine pollution, foraging habitat destruction, illegal poaching of nests and potential threats to the nesting beaches from such sources as global climate change, development, and tourism pressures.

3.2.4 Green Sea Turtle

Green turtles are distributed circumglobally, and can be found in the Pacific, Indian and Atlantic Oceans as well as the Mediterranean Sea (NMFS and USFWS 1991a, Seminoff 2004, NMFS and USFWS 2007a). In 1978, the Atlantic population of the green sea turtle was listed as threatened under the ESA, except for the breeding populations in Florida and on the Pacific coast of Mexico, which were listed as endangered.

3.2.4.1 Pacific Ocean

Green turtles occur in the eastern, central, and western Pacific. Foraging areas are also found throughout the Pacific and along the southwestern U.S. coast (NMFS and USFWS 1998a). Nesting is known to occur in the Hawaiian archipelago, American Samoa, Guam, and various other sites in the Pacific. The only major population (>2,000 nesting females) of green turtles in the western Pacific occurs in Australia and Malaysia, with smaller colonies throughout the area. Green turtles have generally been thought to be declining throughout the Pacific Ocean, with the exception of Hawaii, from a combination of overexploitation and habitat loss (Seminoff 2002). Indonesia has a widespread distribution of green turtles, but has experienced large declines over the past 50 years. Historically, green turtles were used in many areas of the Pacific for food. They were also commercially exploited and this, coupled with habitat degradation, led to their decline in the Pacific (NMFS and USFWS 1998a). Green turtles in the Pacific continue to be affected by poaching, habitat loss or degradation, fishing gear interactions, and fibropapillomatosis (NMFS and USFWS 1998a, NMFS 2004a).

Hawaiian green turtles are genetically distinct and geographically isolated, and the population appears to be increasing in size despite the prevalence of fibropapilloma and spirochidiasis (Aguirre et al. 1998 in Balazs and Chaloupka 2003). The East Island nesting beach in Hawaii is showing a 5.7 percent annual growth rate over 25 plus years (Chaloupka et al. 2007). In the Eastern Pacific, mitochondrial DNA analysis has indicated that there are three key nesting populations: Michoacán, Mexico; Galapagos Islands, Ecuador; and Islas Revillagigedos, Mexico (Dutton 2003). The number of nesting females per year exceeds 1,000 females at each site (NMFS and USFWS 2007a). However, historically, greater than 20,000 females per year are believed to have nested in Michoacán alone (Cliffton et al. 1982, NMFS and USFWS 2007a). Thus, the current number of nesting females is still far below what has historically occurred. There is also sporadic green turtle nesting along the Pacific coast of Costa Rica. However, at least a few of the non-Hawaiian nesting stocks in the Pacific have recently been found to be undergoing long-term increases. Datasets over 25 years in Chichi-jima, Japan; Heron Island, Australia; and Raine Island, Australia show increases (Chaloupka et al. 2007). These increases are thought to be the direct result of long-term conservation measures.

3.2.4.2 Indian Ocean

There are numerous nesting sites for green sea turtles in the Indian Ocean. One of the largest nesting sites for green sea turtles worldwide occurs on the beaches of Oman where an estimated 20,000 green sea turtles nest annually (Hirth 1997, Ferreira et al. 2003). Based on a review of the 32 index sites used to monitor green sea turtle nesting worldwide, Seminoff (2004) concluded that declines in green turtle nesting were evident for many of the Indian Ocean index sites. While several of these had not demonstrated further declines in the more recent past, only the Comoros Island index site in the western Indian Ocean showed evidence of increased nesting (Seminoff 2004).

3.2.4.3 Atlantic Ocean

Life History and Distribution
The estimated age at sexual maturity for green sea turtles is between 20-50 years (Balazs 1982, Frazer and Ehrhart 1985). Green sea turtle mating occurs in the waters off the nesting beaches. Each female deposits 1-7 clutches (usually 2-3) during the breeding season at 12-14 day intervals. Mean clutch size is highly variable among populations, but averages 110-115 eggs/nest. Females usually have 2-4 or more years between breeding seasons, whereas males may mate every year (Balazs 1983). After hatching, green sea turtles go through a post-hatchling pelagic stage where they are associated with drift lines of algae and other debris. At approximately 20- to 25-cm carapace length, juveniles leave pelagic habitats and enter benthic foraging areas (Bjorndal 1997).

Green sea turtles are primarily herbivorous, feeding on algae and sea grasses, but also occasionally consume jellyfish and sponges. The post-hatchling, pelagic-stage individuals are assumed to be omnivorous, but little data are available.

Green sea turtle foraging areas in the southeastern United States include any coastal shallow waters having macroalgae or seagrasses. This includes areas near mainland coastlines, islands, reefs, or shelves, as well as open-ocean surface waters, especially where advection from wind and currents concentrates pelagic organisms (Hirth 1997, NMFS and USFWS 1991a). Principal benthic foraging areas in the southeastern United States include Aransas Bay, Matagorda Bay, Laguna Madre, and the Gulf inlets of Texas (Doughty 1984, Hildebrand 1982, Shaver 1994), the Gulf of Mexico off Florida from Yankeetown to Tarpon Springs (Caldwell and Carr 1957, Carr 1984), Florida Bay and the Florida Keys (Schroeder and Foley 1995), the Indian River Lagoon system, Florida (Ehrhart 1983), and the Atlantic Ocean off Florida from Brevard through Broward Counties (Wershoven and Wershoven 1992, Guseman and Ehrhart 1992). Adults of both sexes are presumed to migrate between nesting and foraging habitats along corridors adjacent to coastlines and reefs.

Population Dynamics and Status

Some of the principal feeding pastures in the western Atlantic Ocean include the upper west coast of Florida and the northwestern coast of the Yucatán Peninsula. Additional important foraging areas in the western Atlantic include the Mosquito Lagoon and Indian River Lagoon systems and nearshore wormrock reefs between Sebastian and Ft. Pierce Inlets in Florida, Florida Bay, the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Caribbean coast of Panama, the Miskito Coast in Nicaragua, and scattered areas along Colombia and Brazil (Hirth 1997). The summer developmental habitat for green turtles also encompasses estuarine and coastal waters from North Carolina to as far north as Long Island Sound (Musick and Limpus 1997).

The vast majority of green sea turtle nesting within the southeastern United States occurs in Florida (Meylan et al. 1995, Johnson and Ehrhart 1994). Green sea turtle nesting in Florida has been increasing since 1989 (Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute Index Nesting Beach Survey Database). Nest counts can also be used to estimate the number of reproductively mature females nesting annually. The 5-year status review for the species identified eight geographic areas considered to be primary sites for green sea turtle nesting in the Atlantic/Caribbean and reviewed the trend in nest count data for each (NMFS and USFWS 2007a). These include: (1) Yucatán Peninsula, Mexico; (2) Tortuguero, Costa Rica; (3) Aves Island, Venezuela; (4) Galibi Reserve, Suriname; (5) Isla Trindade, Brazil; (6) Ascension Island, United Kingdom; (7) Bioko Island, Equatorial Guinea; and (8) Bijagos Achipelago (Guinea-Bissau) (NMFS and USFWS 2007a). Nesting at all of these sites was considered to be stable or increasing with the exception of Bioko Island and the Bijagos Archipelago where the lack of sufficient data precluded a meaningful trend assessment for either site (NMFS and USFWS 2007a). Seminoff (2004) likewise reviewed green sea turtle nesting data for eight sites in the western, eastern, and central Atlantic, including all of the above with the exception that nesting in Florida was reviewed in place of Isla Trindade, Brazil. Seminoff (2004) concluded that all sites in the central and western Atlantic showed increased nesting with the exception of nesting at Aves Island, Venezuela, while both sites in the eastern Atlantic demonstrated decreased nesting. These sites are not inclusive of all green sea turtle nesting in the Atlantic. However, other sites are not believed to support nesting levels high enough that would change the overall status of the species in the Atlantic (NMFS and USFWS 2007a).

By far, the most important nesting concentration for green turtles in the western Atlantic is in Tortuguero, Costa Rica (NMFS and USFWS 2007a). Nesting in the area has increased considerably since the 1970s, and nest count data from 1999-2003 suggest nesting by 17,402-37,290 females per year (NMFS and USFWS 2007a). The number of females nesting per year on beaches in the Yucatán, Aves Island, Galibi Reserve, and Isla Trindade number in the hundreds to low thousands, depending on the site (NMFS and USFWS 2007a). In the United States, certain Florida nesting beaches have been designated index beaches. Index beaches were established to standardize data collection methods and effort on key nesting beaches. The pattern of green turtle nesting shows biennial peaks in abundance with a generally positive trend during the ten years of regular monitoring since establishment of the index beaches in 1989, perhaps due to increased protective legislation throughout the Caribbean (Meylan et al. 1995). An average of 5,039 green turtle nests were laid annually in Florida between 2001 and 2006, with a low of 581 in 2001 and a high of 9,644 in 2005 (NMFS and USFWS 2007a). Data from the index nesting beaches program in Florida support the dramatic increase in nesting. In 2007, there were 9,455 green turtle nests found just on index nesting beaches, the highest since index beach monitoring began in 1989. The number fell back to 6,385 in 2008, but that is thought to be part of the normal biennial nesting cycle for green turtles (FWC Index Nesting Beach Survey Database). Occasional nesting has been documented along the Gulf coast of Florida, at southwest Florida beaches, as well as the beaches on the Florida Panhandle (Meylan et al. 1995). More recently, green turtle nesting occurred on Bald Head Island, North Carolina; just east of the mouth of the Cape Fear River; on Onslow Island; and on Cape Hatteras National Seashore. Increased nesting has also been observed along the Atlantic coast of Florida, on beaches where only loggerhead nesting was observed in the past (Pritchard 1997). Recent modeling by Chaloupka et al. (2007) using data sets of 25 years or more has resulted in an estimate of the Florida nesting stock at the Archie Carr National Wildlife Refuge growing at an annual rate of 13.9 percent, and the Tortuguero, Costa Rica, population growing at 4.9 percent annually.

There are no reliable estimates of the number of immature green sea turtles that inhabit coastal areas (where they come to forage) of the southeastern United States. However, information on incidental captures of immature green sea turtles at the St. Lucie Power Plant (they have averaged 215 green sea turtle captures per year since 1977) in St. Lucie County, Florida (on the Atlantic coast of Florida), show that the annual number of immature green sea turtles captured has increased significantly in the past 26 years (FPL 2005). Ehrhart et al. (2007) has also documented a significant increase in in-water abundance of green turtles in the Indian River Lagoon area. It is likely that immature green sea turtles foraging in the southeastern United States come from multiple genetic stocks; therefore, the status of immature green sea turtles in the southeastern United States might also be assessed from trends at all of the main regional nesting beaches, principally Florida, Yucatán, and Tortuguero.

Threats

The principal cause of past declines and extirpations of green sea turtle assemblages has been the overexploitation of green sea turtles for food and other products. Although intentional take of green sea turtles and their eggs is not extensive within the southeastern United States, green sea turtles that nest and forage in the region may spend large portions of their life history outside the region and outside U.S. jurisdiction, where exploitation is still a threat. However, there are still significant and ongoing threats to green sea turtles from human-related causes in the United

States. These threats include beach armoring, erosion control, artificial lighting, beach disturbance (e.g., driving on the beach), pollution, foraging habitat loss as a result of direct destruction by dredging, siltation, boat damage, other human activities, and interactions with fishing gear. Sea sampling coverage in the pelagic driftnet, pelagic longline, Southeast shrimp trawl, and summer flounder bottom trawl fisheries has recorded takes of green turtles. There is also the increasing threat from green sea turtle fibropapillomatosis disease. Presently, this disease is cosmopolitan and has been found to affect large numbers of animals in some areas, including Hawaii and Florida (Herbst 1994, Jacobson 1990, Jacobson et al. 1991).

There is a large and growing body of literature on past, present, and future impacts of global climate change induced by human activities, i.e., global warming. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. The Environmental Protection Agency's climate change Web page provides basic background information on these and other measured or anticipated effects (see www.epa.gov/climatechange/index.html). However, the impacts on sea turtles currently cannot, for the most part, be predicted with any degree of certainty.

The Intergovernmental Panel on Climate Change has stated that global climate change is unequivocal (IPCC 2007) and its impacts may have significant impacts to the hatchling sex ratios of green turtles (NMFS and USFWS 2007a). In marine turtles, sex is determined by temperature in the middle third of incubation, with female offspring produced at higher temperatures and males at lower temperatures within a thermal tolerance range of 25°-35°C (Ackerman 1997). Increases in global temperature could potentially skew future sex ratios toward higher numbers of females (NMFS and USFWS 2007a). Green sea turtle hatchling size also appears to be influenced by incubation temperatures, with smaller hatchlings produced at higher temperatures (Glenn et al. 2003).

The effects from increased temperatures may be exacerbated on developed nesting beaches where shoreline armoring and construction has denuded vegetation. Sea level rise from global climate change (IPCC 2007) is also a potential problem, particularly for areas with low-lying beaches where sand depth is a limiting factor, as the sea may inundate nesting sites and decrease available nesting habitat (Daniels et al. 1993, Fish et al. 2005, Baker et al. 2006). The loss of habitat as a result of climate change could be accelerated due to a combination of other environmental and oceanographic changes such as increased frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis et al. 2006, Baker et al. 2006).

Other changes in the marine ecosystem caused by global climate change (e.g., salinity, oceanic currents, dissolved oxygen levels, nutrient distribution, etc.) could influence the distribution and abundance of phytoplankton, zooplankton, submerged aquatic vegetation, forage fish, etc., which could ultimately affect the primary foraging areas of green sea turtles.

3.2.4.4 Summary of Status for Atlantic Green Sea Turtles

Green turtles range in the western Atlantic from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean, but are considered rare in benthic areas north of Cape Hatteras

(Wynne and Schwartz 1999). Green turtles face many of the anthropogenic threats described above. In addition, green turtles are also susceptible to fibropapillomatosis, which can result in death. In the continental United States, green turtle nesting occurs on the Atlantic coast of Florida (Ehrhart 1979). Recent population estimates for the western Atlantic area are not available. The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the almost 20 years of regular monitoring since establishment of index beaches in Florida in 1989. However, given the species' late sexual maturity, caution is warranted about over-interpreting nesting trend data collected for less than 20 years.

3.2.5 Loggerhead

The loggerhead sea turtle was listed as a threatened species throughout its global range on July 28, 1978. It was listed because of direct take, incidental capture in various fisheries, and the alteration and destruction of its habitat. Loggerhead sea turtles inhabit the continental shelves and estuarine environments along the margins of the Atlantic, Pacific, and Indian Oceans. The majority of loggerhead nesting occurs in the Western Atlantic Ocean (South Florida, United States), and the western Indian Ocean (Masirah, Oman); in both locations nesting assemblages have more than 10,000 females nesting each year (NMFS and USFWS 2008). Loggerhead sea turtles are the most abundant species of sea turtle in U.S. waters.

3.2.5.1 Pacific Ocean

In the Pacific Ocean, major loggerhead nesting grounds are generally located in temperate and subtropical regions with scattered nesting in the tropics. Within the Pacific Ocean, loggerhead sea turtles are represented by a northwestern Pacific nesting aggregation (located in Japan) and a smaller southwestern nesting aggregation that occurs in Eastern Australia (Great Barrier Reef and Queensland) and New Caledonia (NMFS SEFSC 2001). There are no reported loggerhead nesting sites in the eastern or central Pacific Ocean basin. Data from 1995 estimated the Japanese nesting aggregation at 1,000 female loggerhead sea turtles (Bolten et al. 1996). More recent information suggests that nest numbers have increased somewhat over the period 1998-2004 (NMFS and USFWS 2007e). However, this time period is too short to make a determination of the overall trend in nesting (NMFS and USFWS 2007e). Recent genetic analyses on female loggerheads nesting in Japan suggest that this "subpopulation" is comprised of genetically distinct nesting colonies (Hatase et al. 2002) with precise natal homing of individual females. As a result, Hatase et al. (2002) indicate that loss of one of these colonies would decrease the genetic diversity of Japanese loggerheads; recolonization of the site would not be expected on an ecological time scale. In Australia, long-term census data have been collected at some rookeries since the late 1960s and early 1970s, and nearly all the data show marked declines in nesting populations since the mid-1980s (Limpus and Limpus 2003). The nesting aggregation in Queensland, Australia, was as low as 300 females in 1997.

Pacific loggerhead turtles are captured, injured, or killed in numerous Pacific fisheries including Japanese longline fisheries in the Western Pacific Ocean and South China Seas; direct harvest and commercial fisheries off Baja California, Mexico; commercial and artisanal swordfish fisheries off Chile, Columbia, Ecuador, and Peru; purse seine fisheries for tuna in the eastern tropical Pacific Ocean; and California/Oregon drift gillnet fisheries. In Australia, where turtles are taken in bottom trawl and longline fisheries, efforts have been made to reduce fishery bycatch (NMFS and USFWS 2007e). In addition, the abundance of loggerhead sea turtles in nesting colonies throughout the Pacific basin has declined dramatically over the past 10 to 20 years. Loggerhead turtle colonies in the Western Pacific Ocean have been reduced to a fraction of their former abundance by the combined effects of human activities that have reduced the number of nesting females and reduced the reproductive success of females that manage to nest (e.g., due to egg poaching).

In July 2007, NMFS received a petition requesting that loggerhead sea turtles in the North Pacific be classified as a distinct population segment (DPS) with endangered status and critical habitat designated. The petition also requested that if the North Pacific loggerhead is not determined to meet the DPS criteria that loggerheads throughout the Pacific Ocean be designated as a DPS and listed as endangered. NMFS' 90-day finding for both petitions, published on November 16, 2007 (72 FR 64585 and 64587), was that the petition requests were "warranted" and that a full review would be conducted. A thorough review by the Loggerhead Turtle Biological Review Team determined that Pacific loggerheads can be divided into two DPSs, the North Pacific DPS and South Pacific DPS (Conant et al. 2009).

3.2.5.2 Indian Ocean

Loggerhead sea turtles are distributed throughout the Indian Ocean, along most mainland coasts and island groups (Baldwin et al. 2003). Throughout the Indian Ocean, loggerhead sea turtles face many of the same threats as in other parts of the world including loss of nesting beach habitat, fishery interactions, and turtle meat and/or egg harvesting.

In the southwestern Indian Ocean, loggerhead nesting has shown signs of recovery in South Africa where protection measures have been in place for decades. However, in other southwestern areas (e.g., Madagascar and Mozambique) loggerhead nesting groups are still affected by subsistence hunting of adults and eggs (Baldwin et al. 2003). The largest known nesting group of loggerheads in the world occurs in Oman in the Northern Indian Ocean. An estimated 20,000-40,000 females nest each year at Masirah, the largest nesting site within Oman (Baldwin et al. 2003). In the Eastern Indian Ocean, all known nesting sites are found in Western Australia (Dodd 1988). As has been found in other areas, nesting numbers are disproportionate within the area, with the majority of nesting occurring at a single location. This may, however, be the result of fox predation on eggs at other Western Australia nesting sites (Baldwin et al. 2003). A thorough review by the Loggerhead Turtle Biological Review Team determined that Indian Ocean loggerheads can be divided into three DPSs, the North Indian Ocean DPS, Southeast Indo-Pacific Ocean DPS, and Southwest Indian Ocean DPS (Conant et al. 2009).

3.2.5.3 Mediterranean Sea

Nesting in the Mediterranean is confined almost exclusively to the eastern basin. The highest level of nesting in the Mediterranean occurs in Greece, with an average of 3,050 nests per year. There is a long history of exploitation of loggerheads in the Mediterranean. Although much of this is now prohibited, some directed take still occurs. Loggerheads in the Mediterranean also face the threat of habitat degradation, incidental fishery interactions, vessel strikes, and marine pollution (Margaritoulis et al. 2003). Longline fisheries, in particular, are believed to catch thousands of juvenile loggerheads each year (NMFS and USFWS 2007e), although genetic analyses indicate that only a portion of the loggerheads captured originate from nesting groups in the Mediterranean (Laurent et al. 1998). A thorough review by the Loggerhead Turtle Biological Review Team determined that Mediterranean loggerheads comprise a separate DPSs, the Mediterranean Sea DPS (Conant et al. 2009).

3.2.5.4 Atlantic Ocean

In the Western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the Gulf coast of Florida. Previous section 7 analyses have recognized at least five Western Atlantic subpopulations, divided geographically as follows: (1) a northern nesting subpopulation, occurring from North Carolina to Northeast Florida at about 29°N; (2) a South Florida nesting subpopulation, occurring from 29°N on the east coast to Sarasota on the west coast; (3) a Florida Panhandle nesting subpopulation, occurring at Eglin AFB and the beaches near Panama City, Florida; (4) a Yucatán nesting subpopulation, occurring on the Eastern Yucatán Peninsula, Mexico (Márquez 1990 and TEWG 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (NMFS SEFSC 2001). The recently published recovery plan for the Northwest Atlantic population of loggerhead sea turtles concluded, based on recent advances in genetic analyses, that there is no genetic distinction between loggerheads nesting on adjacent beaches along the Florida Peninsula and that specific boundaries for subpopulations could not be designated based on genetic differences alone. Thus, the plan uses a combination of geographic distribution of nesting densities, geographic separation, and geopolitical boundaries, in addition to genetic differences, to identify recovery units. The recovery units are: (1) the Northern Recovery Unit (Florida/Georgia border north through southern Virginia); (2) the Peninsular Florida Recovery Unit (Florida/Georgia border through Pinellas County, Florida); (3) the Dry Tortugas Recovery Unit (islands located west of Key West, Florida); (4) the Northern Gulf of Mexico Recovery Unit (Franklin County, Florida, through Texas); and (5) the Greater Caribbean Recovery Unit (Mexico through French Guiana, the Bahamas, Lesser Antilles, and Greater Antilles) (NMFS and USFWS 2008). The recovery plan concluded that all recovery units are essential to the recovery of the species. The Loggerhead Biological Review Team determined that loggerhead turtles in the Atlantic meet the required characteristics to be separated into three DPSs, the Northwest Atlantic DPS, Northeast Atlantic DPS, and South Atlantic DPS (Conant et al. 2009).

Life History and Distribution
Past literature gave an estimated age at maturity of 21-35 years (Frazer and Ehrhart 1985, Frazer et al. 1994) with the benthic immature stage lasting at least 10-25 years. However, based on new data from tag returns, strandings, and nesting surveys, NMFS SEFSC (2001) estimated ages of maturity ranging from 20-38 years and benthic immature stage lasting from 14-32 years.

Mating takes place in late March-early June, and eggs are laid throughout the summer, with a mean clutch size of 100-126 eggs in the southeastern United States. Individual females nest multiple times during a nesting season, with a mean of 4.1 nests per individual (Murphy and Hopkins 1984). Nesting migrations for an individual female loggerhead are usually on an interval of 2-3 years, but can vary from 1-7 years (Dodd 1988). Generally, loggerhead sea turtles originating from the Western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years or more. Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm straight-line carapace length, they begin to live in coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico, although some loggerheads may move back and forth between the pelagic and benthic environment (Witzell 2002). Benthic immature loggerheads (sea turtles that have come back to inshore and nearshore waters), the life stage following the pelagic immature stage, have been found from Cape Cod, Massachusetts, to southern Texas, and occasionally strand on beaches in northeastern Mexico.

Tagging studies have shown loggerheads that have entered the benthic environment undertake routine migrations along the coast that are limited by seasonal water temperatures. Loggerhead sea turtles occur year-round in offshore waters off North Carolina where water temperature is influenced by the Gulf Stream. As coastal water temperatures warm in the spring, loggerheads begin to immigrate to North Carolina inshore waters (e.g., Pamlico and Core Sounds) and also move up the coast (Epperly et al. 1995a-c), occurring in Virginia foraging areas as early as April and on the most northern foraging grounds in the Gulf of Maine in June. The trend is reversed in the fall as water temperatures cool. The large majority of loggerheads leave the Gulf of Maine by mid-September but some may remain in mid-Atlantic and Northeast areas until late fall. By December, loggerheads have emigrated from inshore North Carolina waters and coastal waters to the north to waters offshore of North Carolina, particularly off Cape Hatteras, and waters further south where the influence of the Gulf Stream provides temperatures favorable to sea turtles ($\geq$ 11°C) (Epperly et al. 1995a-c). Loggerhead sea turtles are year-round residents of Central and South Florida.

Pelagic and benthic juveniles are omnivorous and forage on crabs, mollusks, jellyfish, and vegetation at or near the surface (Dodd 1988). Sub-adult and adult loggerheads are primarily coastal dwelling and typically prey on benthic invertebrates such as mollusks and decapod crustaceans in hardbottom habitats.

More recent studies are revealing that the loggerhead's life history is more complex than previously believed. Rather than making discrete developmental shifts from oceanic to neritic environments, research is showing that both adults and (presumed) neritic stage juveniles continue to use the oceanic environment and will move back and forth between the two habitats (Witzell 2002, Blumenthal et al. 2006, Hawkes et al. 2006, McClellan and Read 2007). One of the studies tracked the movements of adult females post-nesting and found a difference in habitat use was related to body size, with larger turtles staying in coastal waters and smaller turtles traveling to oceanic waters (Hawkes et al. 2006). A tracking study of large juveniles found that the habitat preferences of this life stage were also diverse, with some remaining in neritic waters while others moved off into oceanic waters (McClellan and Read 2007). However, unlike the Hawkes et al. study (2006), there was no significant difference in the body size of turtles that remained in neritic waters versus oceanic waters (McClellan and Read 2007). In either case, the research not only supports the need to revise the life history model for loggerheads but also demonstrates that threats to loggerheads in both the neritic and oceanic environments are likely impacting multiple life stages of this species.

Population Dynamics and Status

A number of stock assessments and similar reviews (TEWG 1998, TEWG 2000, NMFS SEFSC 2001, Heppell et al. 2003, NMFS and USFWS 2008, Conant et al. 2009, TEWG 2009) have examined the stock status of loggerheads in the Atlantic Ocean, but none have been able to develop a reliable estimate of absolute population size.

Numbers of nests and nesting females can vary widely from year to year. However, nesting beach surveys can provide a reliable assessment of trends in the adult female population, due to the strong nest site fidelity of females turtles, as long as such studies are sufficiently long and effort and methods are standardized (see, e.g., NMFS and USFWS 2008, Meylan 1982). NMFS and USFWS (2008) concluded that the lack of change in two important demographic parameters of loggerheads, remigration interval and clutch frequency, indicate that time series on numbers of nests can provide reliable information on trends in the female population. Recent analysis of available data for the Peninsular Florida Recovery Unit has led to the conclusion that the observed decline in nesting for that unit over the last several years can best be explained by an actual decline in the number of adult female loggerheads in the population (Witherington et al. 2009).

Annual nest totals from beaches within what NMFS and USFWS have defined as the Northern Recovery Unit (NRU) averaged 5,215 nests from 1989-2008, a period of near-complete surveys of NRU nesting beaches (GDNR unpublished data, NCWRC unpublished data, SCDNR unpublished data), representing approximately 1,272 nesting females per year (4.1 nests per female, Murphy and Hopkins 1984). The loggerhead nesting trend from daily beach surveys showed a significant decline of 1.3 percent annually. Nest totals from aerial surveys conducted by SCDNR showed a 1.9 percent annual decline in nesting in South Carolina since 1980. Overall, there is strong statistical data to suggest the NRU has experienced a long-term decline. Data in 2008 has shown improved nesting numbers, but future nesting years will need to be analyzed to determine if a change in trend is occurring. In 2008, 841 loggerhead nests were observed compared to the 10-year average of 715 nests in North Carolina. In South Carolina, 2008 was the seventh highest nesting year on record since 1980, with 4,500 nests, but this did not change the long-term trend line indicating a decline on South Carolina beaches. Georgia beach surveys located a total of 1,648 nests in 2008. This number surpassed the previous statewide record of 1,504 nests in 2003. According to analyses by Georgia DNR, the 40-year time-series trend data show an overall decline in nesting, but the shorter comprehensive survey data (20 years) indicate a stable population (SCDNR 2008, GDNR unpublished data, NCWRC unpublished data, SCDNR unpublished data).

Another consideration that may add to the importance and vulnerability of the NRU is the sex ratios of this subpopulation. NMFS scientists have estimated that the Northern subpopulation produces 65 percent males (NMFS SEFSC 2001). However, research conducted over a limited time frame has found opposing sex ratios (Wyneken et al. 2004), so further information is needed to clarify the issue. Since nesting female loggerhead sea turtles exhibit nest fidelity, the continued existence of the Northern subpopulation is related to the number of female hatchlings that are produced. Producing fewer females will limit the number of subsequent offspring produced by the subpopulation.

The Peninsular Florida Recovery Unit (PFRU) is the largest loggerhead nesting assemblage in the Northwest Atlantic. A near-complete nest census undertaken from 1989 to 2007 showed a mean of 64,513 loggerhead nests per year, representing approximately 15,735 nesting females per year (from NMFS and USFWS 2008). An analysis of index nesting beach data shows a decline in nesting by the PFRU between 1989 and 2008 of 26 percent over the period, and a mean annual rate of decline of 1.6 percent (Witherington et al. 2009, NMFS and USFWS 2008). In 2008, nesting numbers increased significantly compared with the greatly depressed nesting seen in the previous years, returning to 2002 nesting levels. However, early 2009 nesting data appears to show that this does not signify a reversal in the negative trend. Projected nesting for 2009, based upon nesting counts for May and June, indicates a likely return to the low nesting numbers of recent years (B. Witherington Power Point presentation slide based upon FWRI loggerhead index nesting beach data 2009)

The remaining three recovery units—Dry Tortugas (DTRU), Northern Gulf of Mexico (NGMRU), and Greater Caribbean (GCRU)—are much smaller nesting assemblages but still considered essential to the continued existence of the species. Nesting surveys for the DTRU are conducted as part of Florida's statewide survey program. Survey effort has been relatively stable during the 9-year period from 1995-2004 (although the 2002 year was missed). Nest counts ranged from 168-270, with a mean of 246, but with no detectable trend during this period (Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Statewide Nesting Beach Survey Data, NMFS and USFWS 2008). Nest counts for the NGMRU are focused on index beaches rather than all beaches where nesting occurs. The 12-year dataset (1997-2008) of index nesting beaches in the area shows a significant declining trend of 4.7 percent annually (NMFS and USFWS 2008). Similarly, nesting survey effort has been inconsistent among the GCRU nesting beaches and no trend can be determined for this subpopulation. Zurita et al. (2003) found a statistically significant increase in the number of nests on seven of the beaches on Quintana Roo, Mexico, from 1987-2001, where survey effort was consistent during the period. However, nesting has declined since 2001, and the previously reported increasing trend appears to not have been sustained (NMFS and USFWS 2008).

Determining the meaning of the nesting decline data is confounded by various in-water research that suggests the abundance of neritic juvenile loggerheads is steady or increasing (Ehrhart et al. 2007, M. Bresette pers. comm. regarding captures at the St. Lucie Power Plant, SCDNR unpublished SEAMAP-SA data, Epperly et al. 2007). Ehrhart et al. (2007) found no significant regression-line trend in the long-term dataset. However, notable increases in recent years and a statistically significant increase in CPUE of 102.4 percent from the 4-year period of 1982-1985 to the 2002-2005 periods were found. Epperly et al. (2007) determined the trends of increasing loggerhead catch rates from all the aforementioned studies in combination provide evidence there has been an increase in neritic juvenile loggerhead abundance in the southeastern United States in the recent past. A study led by the South Carolina Department of Natural Resources found that standardized trawl survey CPUEs for loggerheads from South Carolina to North Florida was 1.5 times higher in summer 2008 than summer 2000. However, even though there were persistent inter-annual increases from 2000-2008, the difference was not statistically significant, likely due to the relatively short time series. Comparison to other datasets from the 1950s through 1990s showed much higher CPUEs in recent years regionally and in the South Atlantic Bight, leading SCDNR to conclude that it is highly improbable that CPUE increases of such magnitude could occur without a real and substantial increase in actual abundance (Arendt et al. 2009). Whether this increase in abundance represents a true population increase among juveniles or merely a shift in spatial occurrence is not clear. NMFS and USFWS (2008), citing Bjorndal et al. 2005, caution about extrapolating localized in-water trends to the broader population and relating localized trends in neritic sites to population trends at nesting beaches. The apparent overall increase in the abundance of neritic loggerheads in the southeastern U.S. may be due to increased abundance of the largest Stage III individuals (oceanic/neritic juveniles, historically referred to as small benthic juveniles), which could indicate a relatively large cohort that will recruit to maturity in the near future. However, such an increase in adults may be temporary, as in-water studies throughout the eastern U.S. also indicate a substantial decrease in the abundance of the smallest Stage III loggerheads, a pattern also corroborated by stranding data (TEWG 2009).

The NMFS SE Fishery Science Center has developed a preliminary stage/age demographic model to help determine the estimated impacts of mortality reductions on loggerhead sea turtle population dynamics (NMFS-SEFSC 2009). This model does not incorporate existing trends in the data (such as nesting trends) but instead relies on utilizing the available information on the relevant life-history parameters for sea turtles and then predicts future population trajectories based upon model runs using those parameters. Therefore, the model results do not build upon, but instead are complementary to, the trend data obtained through nest counts and other observations. The model uses the range of published information for the various parameters including mortality by stage, stage duration (years in a stage), and fecundity parameters such as eggs per nest, nests per nesting female, hatchling emergence success, sex ratio, and remigration interval. Model runs were done for each individual recovery unit as well as the western North Atlantic population as a whole, and the resulting trajectories were found to be very similar. One of the most robust results from the model was an estimate of the adult female population size for the western North Atlantic in the 2004-2008 time frame. The distribution resulting from the model runs suggest the adult female population size to be likely between approximately 20,000 to 40,000 individuals, with a low likelihood of being up to 70,000. A much less robust estimate for total benthic females in the western North Atlantic was also obtained, with a likely range of approximately 30,000-300,000 individuals, up to less than 1 million.

The results of one set of model runs suggest that the population is most likely declining, but this result was very sensitive to the choice of the position of the parameters within their range and hypothesized distributions. This example was run to predict the distribution of projected population trajectories for benthic females using a range of starting population numbers from the 30,000 estimated minimum to the greater than the 300,000 likely upper end of the range and declining trajectories were estimated for all of the population estimates. After 10,000 simulation runs of the models using the parameter ranges, 14 percent of the runs resulted in growing populations, while 86 percent resulted in declining populations. While this does not translate to an equivalent statement that there is an 86 percent chance of a declining population, it does illustrate that given the life history parameter information currently thought to comprise the likely range of possibilities, it appears most likely that with no changes to those parameters the population is projected to decline. Additional model runs using the range of values for each life history parameter, the assumption of non-uniform distribution for those parameters, and a 5 percent natural (non-anthropogenic) mortality for the benthic stages resulted in a determination that a 60-70 percent reduction in anthropogenic mortality in the benthic stages would be needed to bring 50 percent of the model runs to a static (zero growth or decline) or increasing trajectory.

As a result of the large uncertainty in our knowledge of loggerhead life history, at this point predicting the future populations or population trajectories of loggerhead sea turtles with precision is very uncertain. The model results, however, are useful in guiding future research needs to better understand the life history parameters that have the most significant impact in the model. Additionally, the model results provide valuable insights into the likely overall declining status of the species and in the impacts of large-scale changes to various life history parameters (such as mortality rates for given stages) and how they may change the trajectories. The results of the model, in conjunction with analyses conducted on nest count trends (such as Witherington et al. 2009) which have suggested that the population decline is real, provides a strong basis for the conclusion that the western North Atlantic loggerhead population is in decline. NMFS also convened a new Turtle Expert Working Group (TEWG) for loggerhead sea turtles that gathered available data and examining the potential causes of the nesting decline and what the decline means in terms of population status. The TEWG ultimately could not determine whether or not decreasing annual numbers of nests among the Western North Atlantic loggerhead subpopulations were due to stochastic processes resulting in fewer nests, a decreasing average reproductive output of the adult females, decreasing numbers of adult females, or a combination of those factors. Past and present mortality factors that could impact current loggerhead nest numbers are many, and it is likely that several factors compound to create the current decline. Regardless of the source of the decline, it is clear that the reduced nesting will result in depressed recruitment to subsequent life stages over the coming decades (TEWG 2009).

Threats

The 5-year status review of loggerhead sea turtles recently completed by NMFS and the USFWS provides a summary of natural as well as anthropogenic threats to loggerhead sea turtles (NMFS and USFWS 2007e). The Loggerhead Recovery Team also undertook a comprehensive evaluation of threats to the species, and described them separately for the terrestrial, neritic, and oceanic zones (NMFS and USFWS 2008). The diversity of sea turtles' life history leaves them susceptible to many natural and human impacts, including impacts while they are on land, in the benthic environment, and in the pelagic environment. Hurricanes are particularly destructive to sea turtle nests. Sand accretion and rainfall that result from these storms, as well as wave action, can appreciably reduce hatchling success. For example in 1992 all of the eggs over a 90-mile length of coastal Florida were destroyed by storm surges on beaches that were closest to the eye of Hurricane Andrew (Milton et al. 1994). Also, many nests were destroyed during the 2004 and 2005 hurricane seasons. Other sources of natural mortality include cold-stunning and biotoxin exposure.

Anthropogenic factors that impact hatchlings and adult female sea turtles on land or the success of nesting and hatching include: beach erosion, beach armoring and nourishment, artificial lighting, beach cleaning, increased human presence, recreational beach equipment, beach driving, coastal construction and fishing piers, exotic dune and beach vegetation, and poaching. An increase in human presence at some nesting beaches or close to nesting beaches has led to secondary threats such as the introduction of exotic fire ants, feral hogs, dogs, and an increased presence of native species (e.g., raccoons, armadillos, and opossums), which raid and feed on turtle eggs. Although sea turtle nesting beaches are protected along large expanses of the Northwest Atlantic coast (in areas like Merritt Island, Archie Carr, and Hobe Sound National Wildlife Refuges), other areas along these coasts have limited or no protection. Sea turtle nesting and hatching success on unprotected high density East Florida nesting beaches from Indian River to Broward County are affected by all of the above threats.

Loggerhead sea turtles are affected by a completely different set of anthropogenic threats in the marine environment. These include oil and gas exploration, coastal development, and transportation, marine pollution (which may have a direct impact, or an indirect impact by causing harmful algal blooms), underwater explosions, hopper dredging, offshore artificial lighting, power plant entrainment and/or impingement, entanglement in debris, ingestion of marine debris, marina and dock construction and operation, boat collisions, poaching, and fishery interactions. Loggerheads in the pelagic environment are exposed to a series of longline fisheries, which include the highly migratory species' Atlantic pelagic longline fisheries, an Azorean longline fleet, a Spanish longline fleet, and various longline fleets in the Mediterranean Sea (Aguilar et al. 1995, Bolten et al. 1994, Crouse 1999b). Loggerheads in the benthic environment in waters off the coastal United States are exposed to a suite of fisheries in federal and state waters including trawl, purse seine, hook-and-line, gillnet, pound net, longline, and trap fisheries. The sizes and reproductive values of sea turtles taken by fisheries vary significantly, depending on the location and season of the fishery, and size-selectivity resulting from gear characteristics. Therefore, it is possible for fisheries that interact with fewer, more reproductively valuable turtles to have a greater detrimental effect on the population than one that takes greater numbers of less reproductively valuable turtles if the fishery removes a higher overall reproductive value from the population (Wallace et al. 2008). The Loggerhead Biological Review Team determined that the greatest threats to the Northwest Atlantic DPS of loggerheads result from cumulative fishery bycatch in neritic and oceanic habitats (Conant et al. 2009). Attaining a more thorough understanding of the characteristics, as well as the quantity, of sea turtle bycatch across all fisheries is of great importance.

There is a large and growing body of literature on past, present, and future impacts of global climate change induced by human activities, i.e., global warming. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. The Environmental Protection Agency's climate change Web page provides basic background information on these and other measured or anticipated effects (see www.epa.gov/climatechange/index.html). However, the impacts on sea turtles currently cannot, for the most part, be predicted with any degree of certainty.

The Intergovernmental Panel on Climate Change has stated that global climate change is unequivocal (IPCC 2007) and its impacts may have significant impacts to the hatchling sex ratios of loggerhead sea turtles (NMFS and USFWS 2007e). In marine turtles, sex is determined by temperature in the middle third of incubation with female offspring produced at higher temperatures and males at lower temperatures within a thermal tolerance range of 25°-35°C (Ackerman 1997). Increases in global temperature could potentially skew future sex ratios toward higher numbers of females (NMFS and USFWS 2007e). Modeling suggests an increase of 2°C in air temperature would result in a sex ratio of over 80 percent female offspring for loggerheads nesting near Southport, North Carolina. The same increase in air temperatures at nesting beaches in Cape Canaveral, Florida, would result in close to 100 percent female offspring. More ominously, an air temperature increase of 3°C is likely to exceed the thermal threshold of most clutches, leading to death (Hawkes et al. 2007).

Warmer sea surface temperatures have been correlated to an earlier onset of loggerhead nesting in the spring (Weishampel et al. 2004, Hawkes et al. 2007), as well as short inter-nesting intervals (Hays et al. 2002) and shorter nesting season (Pike et al. 2006).

The effects from increased temperatures may be exacerbated on developed nesting beaches where shoreline armoring and construction have denuded vegetation. Erosion control structures could potentially result in the permanent loss of nesting beach habitat or deter nesting females (NRC 1990). Alternatively, nesting females may nest on the seaward side of the erosion control structures, potentially exposing them to repeated tidal overwash (NMFS and USFWS 2007e). Sea level rise from global climate change (IPCC 2007) is also a potential problem, particularly for areas with low-lying beaches where sand depth is a limiting factor, as the sea may inundate nesting sites and decrease available nesting habitat (Daniels et al. 1993, Fish et al. 2005, Baker et al. 2006). The loss of habitat as a result of climate change could be accelerated due to a combination of other environmental and oceanographic changes such as an increase in the frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis et al. 2006, Baker et al. 2006).

Other changes in the marine ecosystem caused by global climate change (e.g., salinity, oceanic currents, dissolved oxygen levels, nutrient distribution, etc.) could influence the distribution and abundance of phytoplankton, zooplankton, submerged aquatic vegetation, crustaceans, mollusks, forage fish, etc., which could ultimately affect the primary foraging areas of loggerhead sea turtles.

Actions have been taken to reduce anthropogenic impacts to loggerhead sea turtles from various sources, particularly since the early 1990s. These include lighting ordinances, predation control, and nest relocations to help increase hatchling survival, as well as measures to reduce the mortality of pelagic immatures, benthic immatures, and sexually mature age classes in various fisheries and other marine activities. Recent actions have taken significant steps towards reducing the environmental baseline and improving the status of all loggerhead subpopulations. For example, the TED regulation published on February 21, 2003 (68 FR 8456), represents a significant improvement in the baseline affecting loggerhead sea turtles. Shrimp trawling is considered to be the largest source of anthropogenic mortality on loggerheads.

3.2.5.3 Summary of Status for Loggerhead Sea Turtles

In the Pacific Ocean, loggerhead sea turtles are represented by a northwestern Pacific nesting aggregation (located in Japan) and a smaller southwestern nesting aggregation that occurs in Australia (Great Barrier Reef and Queensland) and New Caledonia. The abundance of loggerhead sea turtles on nesting colonies throughout the Pacific basin has declined dramatically over the past 10 to 20 years. Data from 1995 estimated the Japanese nesting aggregation at 1,000 female loggerhead sea turtles (Bolten et al. 1996), but it has probably declined since 1995 and continues to decline (Tillman 2000). The nesting aggregation in Queensland, Australia, was as low as 300 females in 1997.

In the Atlantic Ocean, absolute population size is not known, but based on extrapolation of nesting information, loggerheads are likely much more numerous than in the Pacific Ocean. The NMFS recognizes five recovery units of loggerhead sea turtles in the western North Atlantic based on genetic studies and management regimes. Cohorts from all of these are known to occur within the action area of this consultation. There are long-term declining nesting trends for the two largest Western Atlantic recovery units: the PFRU and the NRU. Furthermore, no long-term data suggest any of the loggerhead subpopulations throughout the entire North Atlantic are increasing in annual numbers of nests (TEWG 2009). Additionally, using both computation of susceptibility to quasi-extinction and stage-based deterministic modeling to determine the effects of known threats to the Northwest Atlantic DPS, the Loggerhead Biological Review Team determined that this DPS is likely to decline in the foreseeable future, driven primarily by the mortality of juvenile and adult loggerheads from fishery bycatch throughout the North Atlantic Ocean. These computations were done for each of the recovery units, and all of them resulted in an expected decline (Conant et al. 2009). Because of its size, the PFRU may be critical to the survival of the species in the Atlantic Ocean. In the past, this nesting aggregation was considered second in size only to the nesting aggregation on islands in the Arabian Sea off Oman (Ross 1979, Ehrhart 1989, NMFS and USFWS 1991b). However, the status of the Oman colony has not been evaluated recently; and it is located in an area of the world where it is highly vulnerable to disruptive events such as political upheavals, wars, catastrophic oil spills, and lack of strong protections for sea turtles (Meylan et al. 1995). Given the lack of updated information on this population, the status of loggerheads in the Indian Ocean basin overall is essentially unknown. On March 5, 2008, NMFS and USFWS published a 90-day finding that a petitioned request to reclassify loggerhead turtles in the Western North Atlantic Ocean as a distinct population segment may be warranted (73 FR 11849). NMFS and USFWS formed a biological review team to assess the data. The Loggerhead Biological Review Team determined that loggerhead turtles in the Atlantic meet the required characteristics to be separated into three DPSs, the Northwest Atlantic DPS, Northeast Atlantic DPS, and South Atlantic DPS (Conant et al. 2009). On March 10, 2010, NMFS and USFWS announced their determination that Loggerhead sea turtles should be listed as 9 separate DPSs, and that 7 of these, including Northwest Atlantic loggerheads, should be listed as endangered.

All loggerhead subpopulations are faced with a multitude of natural and anthropogenic effects that negatively influence the status of the species. Many anthropogenic effects occur as a result of activities outside of U.S. jurisdiction (i.e., fisheries in international waters).

4.0 ENVIRONMENTAL BASELINE

This section identifies the effects of past and ongoing human and natural factors leading to the current status of the five listed species of sea turtles within the action area. The environmental baseline is a "snapshot" of the action area at a specified point in time and includes state, tribal, local, and private actions already affecting the critical habitat that will occur contemporaneously with the consultation in progress. Unrelated federal actions affecting the species and its critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are federal and other actions within the action area that may benefit the species and its critical habitat.

4.1 Status of Sea Turtles in the Action Area

The five species of sea turtles that occur in the action area are all highly migratory. NMFS believes that no individual members of any of the species are likely to be year-round residents of the action area. Individual animals will make migrations into nearshore waters as well as other areas in the North Atlantic Ocean, including the Caribbean Sea. Therefore, the status of the five species of sea turtles in the Atlantic (see Section 3) most accurately reflects the species status within the action area.

4.2 Factors Affecting Sea Turtles in the Action Area

As stated in Section 2.2 ("Action Area"), the action area for the proposed project includes the marine habitats of the WTA within Apalachee Bay in the northeastern Gulf of Mexico and bordering Franklin, Wakulla, Jefferson, and Taylor counties. Numerous activities have been identified as threats and may affect sea turtles in the action area (see Sections 3.2 and 4.2 and Attachment A). The following analysis examines actions that have been determined as likely to adversely affect these species' environment within the action area.

4.2.1 Federal Actions

In recent years, NMFS has undertaken several ESA section 7 consultations to address the effects of federally-permitted fisheries and other federal actions on threatened and endangered species. Each of those consultations sought to develop ways of reducing the probability of adverse effects of the action on sea turtles. Similarly, recovery actions NMFS has undertaken under the ESA are addressing the problem of take of sea turtles in the fishing and oil and gas industries, vessel operations, and other activities such as Army Corps of Engineers (COE) dredging operations.

4.2.1.1 Fisheries

Adverse effects on threatened and endangered species from several types of fishing gear occur in the Gulf of Mexico. Efforts to reduce the adverse effects of federally-managed commercial fisheries are addressed through the ESA section 7 process. Longline, trawl, hook-and-line, gillnet, and cast net gear fisheries have all been documented as interacting with sea turtles. For each of these fisheries for which there is a federal fishery management plan (FMP) or for which any federal action is taken to manage that fishery, impacts have been evaluated under section 7. Several formal consultations have been conducted on the following fisheries that may operate or have effects in the action area and that NMFS has determined are likely to adversely affect threatened and endangered species: coastal migratory pelagic fishery, Gulf reef fish, Southeast shrimp trawl, Atlantic pelagic swordfish/tuna/shark longline, and Highly Migratory Species Atlantic shark fisheries. An ITS has been issued for the take of sea turtles in each of these fisheries. Authorized takes of listed species are described in Attachment B.

NMFS recently completed a section 7 consultation on the continued authorization of the *coastal migratory pelagic fishery* in the Gulf of Mexico and South Atlantic (NMFS 2007c). In the Gulf of Mexico, hook-and-line, gillnet, and cast net gears are used. The recreational sector uses hook-and-line gear. The hook-and-line effort is primarily trolling. The biological opinion concluded that green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles may be adversely affected by operation of the fishery. However, the proposed action was not expected to jeopardize the continued existence of any of these species and an ITS was provided.

In 2009, NMFS completed a section 7 consultation on the continued authorization of the *Gulf of Mexico reef fish fishery* (NMFS 2009). The biological opinion concluded that green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles may be adversely affected by commercial bottom longline, commercial vertical line, and recreational vertical line gear. However, the proposed action was not expected to jeopardize the continued existence of any of these species and an ITS was provided.

On December 2, 2002, NMFS completed a section 7 consultation and issued an opinion on the impacts of *shrimp trawling in the southeastern United States* (NMFS 2002). NMFS had reinitiated consultation to evaluate shrimp trawling in the southeastern United States under sea turtle conservation regulations as managed by the FMPs for shrimp in the South Atlantic and the Gulf of Mexico. The action, and new information triggering reinitiation, was NMFS' proposed rule to require shrimp trawlers to use larger turtle excluder device (TED) openings and TED grids to allow the release of large loggerhead and leatherback sea turtles. The opinion found that the continued operation of the shrimp trawl fishery under the proposed amendments to the sea turtle conservation regulations as managed by FMPs was not likely to jeopardize the continued existence of any species of sea turtle. The opinion also found that the implementation of the final rule issued on February 21, 2003, was likely to reduce trawl-related mortality of loggerhead and leatherback sea turtles by 94 and 97 percent, respectively.

Atlantic pelagic fisheries for swordfish, tuna, and billfish are known to incidentally capture large numbers of sea turtles, particularly in the pelagic longline component. Pelagic longline, pelagic driftnet, bottom longline, and/or purse seine gear have all been documented to take sea turtles. The Northeast swordfish driftnet portion of the fishery was prohibited during an emergency closure that began in December 1996, and the prohibition was subsequently extended. A permanent prohibition on the use of driftnet gear in the swordfish fishery was published in 1999. NMFS reinitiated consultation on the pelagic longline component of this fishery as a result of exceeded incidental take levels for loggerheads and leatherbacks sea turtles (NMFS 2004b). The resulting biological opinion stated that the long-term continued operation this sector of the fishery was likely to jeopardize the continued existence of leatherback sea turtles, but Reasonable and Prudent Alternatives (RPAs) were implemented allowing for the continued authorization of pelagic longline fishing that would not jeopardize leatherback sea turtles.

NMFS recently issued a biological opinion on the continued authorization of *Highly Migratory Species Atlantic shark fisheries* (NMFS 2008). The commercial fishery uses bottom longline and gillnet gear. The recreational sector of the fishery uses only hook-and-line gear. To protect declining shark stocks the proposed action seeks to greatly reduce the fishing effort in the commercial component of the fishery. These reductions are likely to greatly reduce the interactions between the commercial component of the fishery and sea turtles. The biological opinion provided an ITS that concluded that green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles may be adversely affected by operation of the fishery but that the proposed action was not expected to jeopardize the continued existence of any of these species.

On August 27, 2009, NMFS completed a section 7 consultation and issued an opinion on the impacts of the *spiny lobster fishery in the South Atlantic and Gulf of Mexico* (NMFS 2009). The opinion resulted from the reinitiation of consultation on the implementation of Generic Amendment 3 to the South Atlantic and Gulf of Mexico spiny lobster fishery. The analysis concluded new data were available that revealed the fishery may be affecting ESA-listed species in a way not previously considered. Additionally, the impacts of spiny lobster fishing on the U.S. distinct population segment (DPS) of smalltooth sawfish and *Acropora* species were not analyzed in previous consultations. The opinion found that the spiny lobster fishery was not likely to jeopardize the continued existence of any listed species, including the five listed species of sea turtles.

4.2.1.2 Dredging and Disposal for Beach Renourishment

The construction and maintenance of federal navigation channels, and nearshore and offshore sand mining activities, have been identified as sources of sea turtle mortality because these activities are often performed by hopper dredges. Hopper dredges are large, ocean-going vessels that move relatively rapidly (compared to sea turtle swimming speeds) and can entrain and kill sea turtles as the trailing, suction dragheads of the forward-moving dredge overtake the slower-moving sea turtle. The COE has biological opinions from NMFS addressing hopper dredging in the Atlantic and Gulf of Mexico. A regional biological opinion for the COE was completed in 2003 for maintenance dredging and sand mining in Gulf of Mexico waters. The total authorized take level from COE dredging in the Gulf of Mexico is 38 loggerheads and 19 Kemp's ridleys (see Attachment A for specific details).

4.2.1.3 ESA Section 10 Permits

The ESA allows the issuance of permits to take ESA-listed species for the purposes of scientific research, under ESA section 10(a)(1)(a). Authorized activities range from photographing, weighing, and tagging sea turtles incidentally taken in fisheries, to blood sampling, tissue sampling (biopsy), and performing laparoscopy on intentionally-captured turtles. The number of authorized takes varies widely depending on the research and species involved, but may involve the taking of hundreds of turtles annually. Most takes authorized under these permits are expected to be (and are) non-lethal. Before any research permit is issued, the proposal must be reviewed under the permit regulations (i.e., must show a benefit to the species). In addition, since issuance of the permit is a federal activity, issuance of the permit by NMFS must also be reviewed for compliance with section 7(a)(2) of the ESA to ensure that issuance of the permit does not result in jeopardy to the species or adverse modification of its critical habitat.

4.2.1.4 Vessel Operations

Potential adverse effects from federal vessel operations in the action area and throughout the Gulf of Mexico include operations of the Navy (USN) and Coast Guard (USCG), the Environmental Protection Agency, the National Oceanic and Atmospheric Administration (NOAA), and the COE. NMFS has conducted formal consultations with USCG, USN, and NOAA on their vessel operations. Through the section 7 process, where applicable, NMFS has, and will continue to, establish conservation measures for all these agency vessel operations to avoid or minimize adverse effects to listed species. At the present time, however, they present the potential for some level of interaction. In addition to vessel operations, other military activities including training exercises and ordnance detonation also affect sea turtles. Consultations on individual activities have been completed, but no formal consultation on overall USCG or USN activities in any region has been completed at this time.

4.2.1.5 Oil and Gas Activities

The COE and the Minerals Management Service of the Department of Interior (MMS) issue permits for oil and gas exploration, well development, production, and abandonment/rig removal activities that also may adversely affect turtles. Both these agencies have consulted with NMFS on these activities which include the use of seismic arrays for oil and gas exploration in the Gulf of Mexico, the impacts of which have been addressed in opinions for individual and multi-lease sales. Impacts are expected to result from vessel strikes, noise, marine debris, and the use of explosives to remove oil and gas structures. Authorized take levels for COE and MMS lease sales and rig removals is 12 loggerheads and 7 Kemp's ridleys (see Attachment A for specific details).

4.2.2 State or Private Actions

4.2.2.1 Vessel Traffic

Commercial vessel traffic and recreational boating pursuits can have adverse effects on sea turtles through propeller and boat strike damage. Sea turtles may spend a considerable amount of time on or near the surface of the water, which introduces the potential risk of collision from vessel traffic. However, due to a number of variables including differences in vessel parameters and use patterns, environmental factors, as well as seasonal and regional variances in sea turtle distribution and densities, it is difficult to definitively evaluate potential risk to sea turtles stemming from specific vessel traffic. This difficulty is compounded by a general lack of information on vessel use trends, particularly in regard to offshore vessel traffic. The extent of the impact on sea turtles in the action area from boating is not known at this time.

4.2.2.2 State Fisheries

Recreational fishing from private vessels and from shore does occur in the area. Observations of state recreational fisheries have shown that loggerhead, leatherback, and green sea turtles are known to bite baited hooks, and loggerheads frequently ingest the hooks. Hooked turtles have been reported by the public fishing from boats, piers, and beach, banks, and jetties and from commercial fishermen fishing for reef fish and for sharks with both single rigs and bottom longlines (NMFS 2001b). Additionally, lost fishing gear such as line cut after snagging on rocks, or discarded hooks and line, can also pose an entanglement threat to sea turtles in the area. A detailed summary of the known impacts of hook-and-line incidental captures to loggerhead sea turtles can be found in the TEWG reports (1998; 2000).

4.2.2.3 In-water Research Projects

In Florida, in-water sea turtle research has increased in recent years, but no coordinated trend monitoring program exists for in-water populations. The first step in developing such a program involves determining what research is actually taking place. Researchers in FWRI's marine turtle program inventoried all in-water marine turtle research that has been conducted in Florida. Through the use of interviews, questionnaires, and literature reviews, researchers compiled a comprehensive database containing detailed information on 36 research projects (21 active, 15 inactive) focusing on in-water aggregations of sea turtles. Geographic Information Systems (GIS) maps were also developed for each project that will serve as examples to in-water researchers of how GIS can be used to enhance their studies (FWRI online article 2008 - http://research.myfwc.com/features/view_article.asp?id=27486).

The vast majority of in-water projects (24) are, or were, located on the southeast coast of Florida. Based on the information compiled, candidate projects were identified for inclusion in a statewide in-water index monitoring program that would provide trend information on sea turtles in Florida's waters. Recommendations were presented on how to develop such a program, which would include the measurement of capture effort, promotion of cooperation among in-water research groups, and standardization of data collection methods resulting in a consistent set of measurements.

In addition to dedicated in-water studies, other projects and activities were identified that involve the collection of sea turtle data, often secondary to the primary purpose. These projects provide important data on general turtle distributions and can identify target areas for future in-depth studies. Many of these projects are conducted by other sections of FWRI, including capture efforts and aerial surveys for manatees or fish. Other data come from incidental capture in fisheries research projects, or by the fisheries themselves. Pre-dredge trawling, sea turtle aerial surveys, stranding networks, and satellite tracking of sea turtles also provide important distributional data. The end result of this project is a narrative document that will function as a guide to in-water research in Florida.

4.2.3 Other Potential Sources of Impacts in the Environmental Baseline

4.2.3.1 Marine Debris and Acoustic Impacts

A number of activities that may indirectly affect listed species in the action area of this consultation include anthropogenic marine debris and acoustic impacts. The impacts from these activities are difficult to measure. Where possible, conservation actions are being implemented to monitor or study impacts from these sources.

4.2.3.2 Marine Pollution

Sources of pollutants along the Gulf of Mexico include atmospheric loading of pollutants such as PCBs, stormwater runoff from coastal towns and cities into rivers and canals emptying into bays and the ocean (e.g., Mississippi River), and groundwater and other discharges. Nutrient loading from land-based sources such as coastal community discharges is known to stimulate plankton blooms in closed or semi-closed estuarine systems. The effects on larger embayments are unknown. Although pathological effects of oil spills have been documented in laboratory studies of marine mammals and sea turtles (Vargo et al. 1986), the impacts of many other anthropogenic toxins have not been investigated.

4.2.3.3 Conservation and Recovery Actions Shaping the Environmental Baseline

Under section 6 of the ESA, NMFS may enter into cooperative research and conservation agreements with states to assist in recovery actions of listed species. In the Gulf of Mexico, NMFS currently has an agreement with the State of Florida. Prior to issuance of these agreements, the proposal must be reviewed for compliance with section 7 of the ESA.

NMFS and cooperating states have established an extensive network of Sea Turtle Stranding and Salvage Network (STSSN) participants along the Atlantic and Gulf of Mexico coasts that not only collect data on dead sea turtles, but also rescue and rehabilitate any live stranded sea turtles.

In response to the growing awareness of recreational fishery impacts on sea turtles, in 2006 the Marine Recreational Fishery Statistics Survey (MRFSS) added a survey question regarding sea turtle interactions within recreational fisheries. NMFS is exploring potential revisions to MRFSS to quantify recreational encounters with sea turtles on a permanent basis.

4.3 Summary and Synthesis of Environmental Baseline

In summary, several factors are presently adversely affecting Kemp's sea turtles in the action area. These factors are ongoing and are expected to occur contemporaneously with the proposed action:

- Interactions with commercial and recreational fishing gear.
- Dredge-and-fill activities, including beach renourishment/restoration activities.
- Commercial vessel traffic and recreational boating pursuits will continue to result in vessel strike damage to sea turtles.
- Run-off containing toxins and pollutants from land-based sources.
- Entrainment in the cooling-water systems of electrical generating plants.

These activities are expected to combine to adversely affect the recovery of listed sea turtles throughout their ranges, and in the action area.

5.0 EFFECTS OF THE ACTION

5.1 Vessel and Equipment Strikes

Commercial vessel traffic and recreational boating pursuits can have adverse effects on sea turtles through propeller and boat strike damage. Sea turtles may spend a considerable amount of time on or near the surface of the water, which introduces the potential risk of collision from vessel traffic. CSAR training operations in the WTA by the 38 RQS will involve the use of support vessels, such as a 27-foot Boston whaler and CRRC, a motorized, inflatable Zodiac boat. The 38 RQS will conduct approximately 70 paradrop exercises annually, or 700 paradrop exercises over the 10-year consultation period. NMFS recently completed an analysis on vessel traffic impacts to sea turtles in Florida. The analysis considered information from past ESA section 7 consultations, sea turtle stranding data, surveys on recreational boating patterns, vessel registration data, and other available literature. A range of approaches, from conservative to ultra-conservative, were used to calculate the risk of a vessel strike to a sea turtle per vessel. The ultra-conservative estimate indicated the risk from a single vessel was one sea turtle strike per 300 years. Therefore, the risk of a sea turtle strike associated with the proposed project is discountable. In addition, the likelihood of a sea turtle strike associated with dropping equipment and personnel from aircraft is discountable. The area will be surveyed for sea turtles and marine mammals prior to equipment drops. The drop will be aborted or relocated if these species are present.

5.2 Ingestion of Marine Debris

The ingestion of man-made debris constitutes a potential threat to sea turtles that occur in the action area (Balazs 1985; Carr 1987). Plastic can lodge in an animal's digestive tract causing reduced nutrient absorption, intestinal damage, releases of toxic chemicals, or blockages, which cause starvation (Balazs 1985). Researchers have reported high levels of debris ingestion in all species of stranded sea turtles along the Gulf coast. In studies along the Texas Gulf coast, ingestion rates were highest in loggerheads (51 percent and 26 percent) and green sea turtles (47 percent and 32 percent); leatherback, hawksbill, and Kemp's ridley sea turtles had lower ingestion rates (24, 14, and 4 percent, respectively) (Plotkin and Amos 1988, 1990; Stanley et al. 1988; NRC 1990; Plotkin et al. 1993).

A report listing mortality factors for stranded sea turtles in Florida from 1980 through 2007 (FFWCC 2008) noted that most of the sea turtles that had ingested marine debris (58 percent) were found to have eaten plastic. Some of the types of plastics described included plastic bags, plastic beads, plastic film, and a plastic tube. Considering data from necropsied sea turtles, persistent marine debris (including plastics) was found in 136 cases (5.4 percent of necropsied turtles). The percentage occurrence of ingested marine debris in Florida's sea turtle strandings is relatively low compared to other states. For example, a little over half of the 340 sea turtles found and necropsied in south Texas during 1983 through 1995 were found to have ingested persistent marine debris (Shaver and Plotkin 1998).

Lightsticks, marine location dye markers (sea dye packs), and marine location markers (flares) are currently used by regional military operating groups (Navy and USAF), Coast Guard groups, and civilians within the Gulf of Mexico for training, rescue, recreational, or commercial activities. Regional military operating groups use some or all three of the items for training and rescue operations. Some Coast Guard groups use the items in their training and rescue operations. Lightsticks are used by fishermen to attract fish and by recreational divers to enhance visibility both at night and in deep-water conditions. Efforts are sometimes made to recover these items, either at sea or during beach cleanups. Depending on local marine and atmospheric conditions, some of these materials generated outside a certain area can be moved into the area via ocean currents. The eventual fate of the items depends on oceanographic conditions, the physical properties of the items, and the state of the items in the marine environment at a given time.

Lightsticks
Military (Navy and USAF) and Coast Guard groups within the Gulf use lightsticks and their derivatives (chemlights, cyalumes) at times during the course of training and rescue operations. Fishermen use lightsticks for attracting fish (lightsticks are attached to the nets and lines), and recreational divers use lightsticks for illumination and safety purposes. Where feasible, some users attempt to recover a portion of the used lightsticks. In addition, cleanups have been sponsored by various organizations to clean up marine debris (including lightsticks) that washes up on beaches. Lightsticks are constructed of high-density polyethylene and are not considered to be easily biodegradable; therefore, they can persist for long periods of time in the marine environment. Due to their physical properties, lightsticks rarely sink to the ocean bottom (this usually only occurs if they are punctured and subsequently filled with water).

Laboratory experiments indicate that sea turtles may be attracted to lightsticks (Wang *et al* 2007). This is possibly because sea turtles mistake them for bioluminescent prey or due to curiosity. However, field experiments are needed to confirm this hypothesis and to discern the degree that other factors, such as ambient lighting and water turbidity conditions, affect sea turtles' attraction to the lightsticks. Little data regarding ingestion of lightsticks by sea turtles is available. Laist (1996) noted that lightsticks were among a long list of marine debris ingested by sea turtles, but found that entanglement in marine debris was more likely than ingestion to injure or kill marine life. Two sea turtles in the Sea Turtle Stranding and Salvage Network database (for the U.S. Atlantic and Gulf Coasts from 1998 through 2005), were found to have ingested lightsticks, though it was not possible to determine the effects that ingestion had on the sea turtles and whether it contributed to their deaths.

Cyalume is the active ingredient that creates the illumination associated with lightstick activation. Dimethyl phthalate is a component of cyalume and possesses a moderate potential to affect some aquatic organisms (Eastman 1999). Although it does not meet the criteria for a hazardous waste, hydrogen peroxide, one of the lightstick constituents, is an irritant to mammalian skin and mucous membranes at high concentrations. Due to the high-density plastic used to seal the lightsticks, it is unlikely that the materials contained within the lightstick would ever be discharged to the environment. However, should this ever occur, no harmful effects to aquatic organisms would result, due to the fact that when diluted with a large amount of water, neither dimethyl phthalate nor hydrogen peroxide are expected to result in adverse effects on marine organisms. If a sea turtle were to ingest a lightstick, releasing its chemical components internally, it is possible the sea turtle could become sick or die. When conditions allow, personnel involved in training operations within the WTA attempt to recover lightsticks within their immediate vicinity at the completion of each exercise.

Sea Dye Packs

Sea dye contained within marine location markers is a liquid that does not persist in the marine environment for more than 2 hours. However, the plastic bag that contains the sea dye is constructed of a molded, phenolic material. Even after a decade of weathering, the biodegradation of polyethylene (plastic) occurs very slowly (Hakkarainen and Albertsson 2004). Some plastic bags and pieces of plastic bags have been found on the ocean bottom, or partially buried in the ocean sediments (Ocean Conservancy 2009).

Marine Location Markers (Flares)

During the course of training and rescue operations, military operating groups (Navy and USAF), Coast Guard groups, and mariners within the Gulf of Mexico at times use flares. When deployed, the materials within the flare ignite and burn, emitting smoke and thereby marking the desired location. The MK6 flare is designed to completely incinerate its wooden housing and internal contents. The smaller MK25 flare is composed of an aluminum housing containing the flare materials. Upon combustion of the internal flare materials, the aluminum housing would sink. When flares work to performance specifications, they do not present a hazard to humans or to the marine environment. In the instances when the flares fail to ignite or do not burn completely, they can float on the ocean surface and eventually get washed onshore. If unused marine location flares wash onto beaches, they can present a potential hazard due to their explosive components.

The reliability rate (the percentage of time successful deployment of the marine location markers occurs) for the MK6 and MK25 marine location markers is between 90 and 95 percent. Every 3 years, the flares undergo lot reliability tests in order to ensure a high reliability rate. Should a lot reliability test result in a reliability rate less than 88 percent, the flares are removed from service. At the current reliability rate (90-95 percent), it is estimated that WTA activities could potentially result in the deposition of 127 to 254 unexpended marine location markers into the marine environment annually. A small percentage of MK6 and MK25 flares could fail to deploy, and could remain on the surface of the ocean. Depending on oceanographic conditions, the state of the flare, and the distance from shore that they are deployed, marine location markers that do not deploy successfully could reach the beach environment. Generally, as marine location markers are used closer to shore, the potential for failed marine location markers to end up at a beach environment increases. Due to the chemical and physical properties comprising the marine location markers, failed marine location markers are considered "unexploded ordnance."

Both the MK6 and the MK25 ignition compositions contain small amounts of lead dioxide. Lead dioxide is a recognized poison and a powerful oxidizer that is a severe eye, skin, and mucous membrane irritant. When the ignition composition is heated, it emits toxic fumes of lead. The MK25 also contains phosphorous, a substance that is explosive, flammable, and toxic. Combustion products from the MK6 and MK25 are considered to be severely toxic, and inhalation of the fumes should be avoided. As the flares would be deployed in a dynamic environment, possible impacts associated with deployment would not be hazardous. This is because the pollutants would be quickly and effectively reduced to insignificant concentrations through dispersion and advection. Dispersion is a physical process by which pollutants are diffused as they move downwind or downgradient, and results in an associated decrease in contamination. Advection is a physical process by which pollutants are transported away from the source area by physical processes, in this case, wind. The potential for exposure to smoke generated by the flares would be minimal.

Past CSAR Operations in the WTA and Usage of Training Materials

Table 1 shows the maximum proposed annual usage of lightsticks, sea dye, and flares in the WTA. As part of the terms and conditions of the 1999 opinion, NMFS outlined annual reporting requirements to track the use of lightsticks and sea dye packs within the WTA during CSAR training operations. Table 2 presents a summary of the total annual usage of lightsticks and sea dye packs during CSAR training operations within the WTA from 2000 through 2008.

Table 2. Annual Usage of Lightsticks and Sea Dye Packs within the WTA during CSAR Training Operations (2000-2008)*

Year	*Lightsticks*	*Sea Dye Packs*
2000	2,755	33
2001	1,919	45
2002	535	30
2003	1,560	96
2004	2,285	216
2005	2,320	79
2006	400	100
2007	1,935	195
2008	6,912	192
9-yr Total	20,621	986
Annual Avg.	2,291	109
Annual Max.	6,912	216
Proposed Max. Annual #s Assessed in 1999 EA and BO	11,000	1,200

Note: *The 1999 BO did not require the tracking of annual expenditures of flares.
Sources: USAF 1999; NMFS 1999; USAF 2001, 2002, 2003, 2004, 2005, 2006b, 2007, 2008, 2009.

The actual usage of lightsticks and sea dye packs during the previous nine years of CSAR training operations in the WTA was much less than the proposed usage assessed in the original opinion. The maximum number of lightsticks used in any one year was only 6,912, or an average of approximately 2,300 per year. Similarily, the maximum number of sea dye packs proposed for use per year was 1,200 and the total used for the entire nine-year period was only 986, or approximately 100 per year. The actual usage of these materials over the nine years from 2000 through 2008 has been lower than anticipated because of the conflicts in Iraq and Afghanistan. When the WTA was initially established, the USAF was not assuming extended tours of duties in these areas. The annual usage of lightsticks and sea dye packs evaluated in the original and current opinion reflect the maximum CSAR training effort.

The original opinion also required the USAF to contact the Florida coordinator of the Sea Turtle Stranding and Salvage Network (STSSN) and obtain the percentage of sea turtles that were necropsied during the year that had ingested plastic and to ascertain if the ingested plastic had originated from CSAR training materials. These results are presented in Table 3. To date, of the 972 necropsied sea turtles, none of the plastic found within the 28 sea turtles that had ingested plastic was determined to be from CSAR training materials (i.e., lightsticks or sea dye packs) (USAF 2001, 2002, 2003, 2004, 2005, 2006b, 2007, 2008, 2009).

Table 3. Percentage of Necropsied Stranded Sea Turtles with Ingested Plastic (2000-2008)

Year	*Total # Sea Turtles Necropsied*	*# Sea Turtles with Ingested Plastic*
2000	94	3 (3.2%)
2001	80	4 (5%)
2002	119	9 (7.6%)
2003	186	4 (2.2%)
2004	129	3 (2.3%)
2005	111	0
2006	121	4 (3.3%)
2007	36	1 (2.8%)
2008	96	0

Sources: USAF 2001, 2002, 2003, 2004, 2005, 2006b, 2007, 2008, 2009.

Use of Lightsticks, Sea Dye Packs and Flares

Kemp's ridley and loggerhead would likely be the most abundant sea turtles in the general area. Green sea turtles will also likely be abundant in the area given the proximity of seagrass beds in the nearshore areas adjacent to the WTA. However, Kemp's ridleys are most common in the nearshore region, being more frequently observed inside the bays and in estuarine habitats than in offshore areas like the WTA.

While some green turtles may be encountered in the Apalachee Bay area, the coastal zone south of Cedar Key is a more important foraging area for this species. Leatherback sea turtles are pelagic and feed at the surface or in the water column on jellyfish. However, being an offshore pelagic species, leatherback sea turtles would be rare in nearshore waters of the WTA. Loggerheads are expected to be the most common sea turtle at the depths occurring in the WTA. Further, it has been documented that loggerheads have a high rate of debris ingestion, with plastics being the dominant debris type consumed. Should a marine marker-sea turtle interaction occur, the affected species would most likely be the loggerhead.

A total of 14,000 lightsticks, 2,550 flares, and 1,450 sea dye packs could potentially be dropped annually within the WTA. Of the three types of marine markers, flares would be the least likely to be ingested by sea turtles because of their basic construction. Most instances of sea turtles ingesting foreign objects involve soft-plastic derivatives such as plastic bags, plastic sheeting, balloons, and monofilament fishing line that might be confused with jellyfish or other prey (NRC 1990). The MK6 flare is designed to completely incinerate its wooden housing and internal contents. Small amounts of uncombusted wood may float and wash ashore. The smaller MK25 flare is composed of an aluminum housing containing the flare materials. Upon combustion of the internal flare materials, the aluminum housing would sink. The expended remains of either flare would not be an attractant to a feeding or swimming sea turtle. In addition, the size of the expended aluminum casing of the MK25 would preclude any possibility of ingestion by a bottom foraging sea turtle.

The likelihood that either marker would be consumed is low, however, because the expected densities of sea turtles, lightsticks, and expended dye packs in the project area would be low.

The dispersal of buoyant lightsticks would be wind-driven and therefore variable. On average, net dispersal would be expected to be from west to east during winter months and from east to west during summer. Lightsticks, being highly buoyant, could be transported out of the study area by prevailing currents, while others could find their way into coastal seagrass beds, creating more of an aesthetic problem as opposed to a biological hazard. While lightsticks could drift into these coastal habitats, their density would be low following the dispersal occurring in the unknown time interval between the 'point source' release and their stranding on the coast. In addition, the size, shape, and composition of a lightstick make it unlikely that a sea turtle would be able to ingest a lightstick. Sea turtles are known to investigate or 'mouth' potential food items and if a lightstick is encountered a turtle may attempt to consume it. However, there have been no records of sea turtles having ingested lightsticks (Plotkin and Amos 1988, 1990; Stanley et al. 1988; NRC 1990; Plotkin 1993).

Because of its similarity to the types of plastics most often consumed by sea turtles, expended sea dye packs would be the most likely of the marine markers to be consumed if encountered. Over the longer term, neutrally buoyant expended sea dye packs would be of the most concern. If dye packs submerge, they would be less likely to be purged from the marine system. Some could be transported out of the study area by prevailing currents, while others could find their way into coastal seagrass beds. If expended dye packs are not transported out of Apalachee Bay in substantial numbers, the cumulative effect of adding 1,450 sea dye packets per year to the Gulf would increase the probability of a sea turtle encounter. There is also the possibility that sea turtles in the project area could encounter and consume expended sea dye packs released into the WTA during training operations. The encounter may be detrimental or even fatal. Use of sea dye packs and lightsticks may thus result in the incidental take of threatened and endangered sea turtles. Incidental take is defined as take that results from, but is not the purpose of, carrying out an otherwise lawful activity.

Small amounts of ingested debris can kill a sea turtle; however, the predictability of such mortality may be low (Bjorndal et al. 1994). A sea turtle may pass multiple pieces of debris through its gut without any becoming lodged; however, debris may become oriented in such a way to block the gut, resulting in death. Bjorndal et al. (1994) also point out that small amounts of debris could have significant effects on the demography of sea turtles through the absorption of toxins. They cite a study by Lutz (1990) that demonstrated that small pieces of latex and plastic sheeting can be retained in the digestive tract of normally feeding turtles for up to four months. A controlled study by Lutz (1987) showed that low levels of ingestion of plastic by green and loggerhead turtles (one to seven 10- by 10- centimeter pieces) caused no significant changes in food consumption rates, gut passage times, food absorption, energy absorption, dive time, oxygen consumption, and vital blood parameters. However, a fall in blood glucose levels similar to, but at a lower rate than, starvation did occur. The study concluded that, except for minor changes in glucose metabolism, the effects of low levels of ingestion of plastic appeared to be innocuous. In the Bjorndal et al. (1994) study, 24 out of 43 green sea turtles ingested debris. Only two (4.6 percent) of the turtles died as a result of their ingestion of debris, and those turtles had also ingested monofilament fishing line.

Estimate of Annual Sea Turtle Incidental Take Due to Ingestion of Marine Debris
Based on the preceding analysis of the effects of the proposed action, and the distribution of sea turtles in the Gulf of Mexico, NMFS believes sea turtles are likely to ingest some of the plastic debris abandoned as a result of the proposed action. However, NMFS believes that the majority of turtles ingesting these dye packs are not likely to be injured or killed. NMFS' 1999 opinion estimated that ingestion of marine debris associated with the CSAR training operations would result in the take, by injury or mortality, of two sea turtles, most likely Kemp's ridley, loggerhead, or green sea turtles, as they are the most abundant in the project area, though leatherbacks or hawksbills may also be taken if the marine debris is transported further from the WTA. Sea dye packs are the most likely marine debris associated with the proposed project potentially consumed by sea turtles. The proposed maximum annual usage of sea dye packs has increased to 1,450 from the 1,200 evaluated in NMFS' 1999 opinion. This represents a 21 percent increase in the amount of proposed maximum annual sea dye pack usage. However, the actual usage of training materials, including the sea dye packs, is likely to be less than the proposed maximum, as evidenced by the actual usage over the last 10 years of CSAR training operations. In addition, there has been no evidence in 10 years of coordination with the Florida STSSN that sea turtles are ingesting marine debris associated with the CSAR training operations. However, all turtles injured or killed by ingestion of marine debris do not wash up on Florida beaches, and are not available to the Florida STSSN for research. Therefore, NMFS continues to believe that ingestion of marine debris associated with the CSAR training operations will result in the take, by injury or mortality, of two sea turtles, most likely Kemp's ridley, loggerhead, or green sea turtles, as they are the most abundant in the project area, though leatherbacks or hawksbills may also be taken if the marine debris is transported further from the WTA.

6.0 CUMULATIVE EFFECTS

ESA section 7 regulations require NMFS to consider cumulative effects in formulating their biological opinions (50 CFR 402.14). Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this opinion. Because many activities that affect marine habitat involve some degree of federal authorization (e.g., through Mineral Management Service or COE), NMFS expects that ESA section 7 will apply to most major, future actions that could affect sea turtles. In addition, other activities identified in the environmental baseline are expected to continue to affect sea turtles, at similar levels into the foreseeable future.

7.0 JEOPARDY ANALYSIS

The analyses conducted in the previous sections of this opinion serve to provide a basis to determine whether the proposed action would be likely to jeopardize the continued existence of any ESA-listed sea turtles. In Section 5, we outlined how the proposed action can affect these species and the extent of those effects in terms of estimates of the numbers of sea turtles injured or killed. Now we turn to an assessment of each species' response to this impact. We evaluate the overall population effects from the estimated take, and whether those effects of the proposed action, when considered in the context of the status of the species (Section 3), the environmental baseline (Section 4), and the cumulative effects (Section 6), will jeopardize the continued existence of the affected species.

"To jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to appreciably reduce the likelihood of both the survival and the recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). Thus, in making this determination for each species, we must look at whether there will be a reduction in the reproduction, numbers, or distribution. Then, if there is a reduction in one or more of these elements, we evaluate whether it will cause an appreciable reduction in the likelihood of both the survival and the recovery of the species.

In two steps, this section analyzes if the anticipated take from the proposed action will reduce the likelihood of green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles' survival and recovery in the wild. First, we evaluate how each species' population is likely to respond if takes were non-lethal or lethal. Then we evaluate whether the anticipated take will result in any reduction in distribution, reproduction, or numbers of each species that may appreciably reduce the likelihood of survival. Second, we consider how anticipated take is likely to affect these species' recovery in the wild by considering recovery objectives in the recovery plans of each species. Since incidental take affects individuals, some of which may be reproductively mature, we pay specific attention to those objectives that may be affected by reductions in the numbers or reproduction resulting from the proposed action.

The proposed action may result in up to two Kemp's ridley, loggerhead, green, hawksbill, or leatherback sea turtle takes (lethal or non-lethal) during the ensuing 10-year CSAR training operations period.

The non-lethal take of up to two sea turtles annually, in any combination of species, during this period is not expected to have any measurable impact on the reproduction, numbers, or distribution of these species. Those individuals are expected to fully recover such that no reductions in reproduction or numbers of these species are anticipated. No change in the distribution of Kemp's ridley, loggerhead, green, hawksbill, or leatherback sea turtles is anticipated as a result of the project.

The lethal take of up to two sea turtles annually, in any combination of species, during this period would reduce their respective population by up to two, compared to the number that would have been present in the absence of the proposed action, assuming all other variables remained the same. A lethal take could also result in a reduction in future reproduction, assuming the individual was a female and would have survived to reproduce in the future. For example, an adult hawksbill sea turtle can lay 3-5 clutches of eggs every few years (Meylan and Donnelly 1999, Richardson et al. 1999) with up to 250 eggs/nest (Hirth 1980). The loss of one adult female sea turtle, on average, could preclude the production of thousands of eggs and hatchlings, of which a fractional percentage is expected to survive to sexual maturity. Thus, the death of a female eliminates that individual's contribution to future generations, and the action will result in a reduction in sea turtle reproduction. The anticipated take is expected to occur anywhere in the action area and sea turtles generally have large ranges in which they disperse;

thus, no reduction in the distribution of Kemp's ridley, loggerhead, green, hawksbill, or leatherback sea turtles is expected from the take of an individual.

Whether the reductions in numbers and reproduction of these species attributed to CSAR training operations would appreciably reduce their likelihood of survival depends on the probable effect the changes in numbers and reproduction would have relative to current population sizes and trends. Effects of these reductions on recovery depends upon species-specific recovery objectives.

Loggerhead Sea Turtles
The proposed action may result in up to two lethal or non-lethal loggerhead sea turtle takes during a 10-year period.

The potential non-lethal take of two loggerhead sea turtles over a 10-year period is not expected to have any measurable impact on the reproduction, numbers, or distribution of this species. These individuals are expected to fully recover such that no reductions in reproduction, or numbers of loggerhead sea turtles are anticipated. Since these takes may occur anywhere in the action area and would be released within the general area where caught, no change in the distribution of loggerhead sea turtles is anticipated.

The potential lethal take of two loggerhead sea turtles over a 10-year period would reduce the number of loggerheads as compared to their numbers in the absence of the proposed action, assuming all other variables remained the same. Lethal takes could also result in a potential reduction in future reproduction, assuming these individuals were female and would have survived to reproduce. For example, an adult female loggerhead sea turtle can lay 3 or 4 clutches of eggs every 2 to 4 years, with 100 to 130 eggs per clutch. The annual loss of four adult female sea turtles, on average, could preclude the production of thousands of eggs and hatchlings of which a small percentage are expected to survive to sexual maturity. These anticipated takes are expected to occur anywhere in the action area and sea turtles generally have large ranges in which they disperse; thus, no reduction in the distribution of loggerhead sea turtles is expected from these takes.

Whether the reductions in numbers and reproduction of loggerhead sea turtles attributed to CSAR training operations in the Gulf of Mexico would appreciably reduce the likelihood of survival depends on the probable effect the changes in numbers and reproduction would have relative to current population sizes and trends.

Regarding the Florida nesting group of loggerhead sea turtles, a trend analysis of the nesting data collected for Florida's Index Nesting Beach Survey (INBS) program showed a decrease in nesting of 22.3 percent in the annual nest density of surveyed shoreline over a 17-year period (1989-2005) and a 39.5 percent decline since 1998 (letter to NMFS from the Director, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, October 25, 2006; Meylan et al. 2006). Data collected in Florida for the 2007 loggerhead nesting season reveals that the decline in nest numbers has continued, with even fewer nests counted in 2007 in comparison to any previous year of the period, 1989-2007 (Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission web posting November 2007). A significant declining trend in loggerhead nesting of 6.8 percent annually from 1995-2005 has also been detected for the Florida Panhandle nesting group (NMFS and USFWS 2007e) while no trend is detectable for the Dry Tortugas nesting group (NMFS and USFWS 2007e).

However, these declines need to be viewed in the context of the number of nests observed and are not necessarily applicable to the population as a whole. While the number of nests is a proxy for the size of the adult nesting female population, nesting declines do not necessarily mean the numbers of adult females are declining. Likewise, nesting declines do not necessarily mean the population or stock is declining as a whole. In addition, these declining nesting beach trends also seem in contradiction to some in-water survey results. Epperly et al. (2007) reported an annual increase of 13.2 percent in loggerhead catch per unit effort (CPUE) off North Carolina during sea turtle sampling in 1995-1997 and 2001-2003. Ehrhart et al. (2007) also reported a significant increase in loggerhead CPUE over the last four years in the Indian River Lagoon, Florida. Entrainment of loggerheads at St. Lucie Power Plant on Hutchison Island, Florida, has also increased at an average rate of 11 percent per year from 1998 to 2005 (M. Bersette pers. comm. in Epperly et al. 2007).

It is unclear whether nesting beach trends, in-water abundance trends, or some combination of both, best represents the actual status of loggerhead sea turtle populations in the Atlantic. Regardless, we do not believe the loss of up to two individuals over a 10-year period will have a measurable impact on the likelihood of the loggerhead's survival in the wild. Although the declining annual nest density at major loggerhead sea turtle nesting beaches requires further study and analysis to determine the causes and long-term effects on population dynamics, the likelihood of survival in the wild of loggerheads will not be appreciably reduced because of this action. Therefore, we believe that the lethal take of up to two loggerhead sea turtles associated with the proposed action is not expected to cause an appreciable reduction in the likelihood of survival of this species of sea turtles in the wild.

The second revision of the recovery plan for the Northwest Atlantic population of loggerhead sea turtles (NMFS and USFWS 2008), herein incorporated by reference, lists the following relevant recovery objective:

- Ensure that the number of nests in each recovery unit is increasing and that this increase corresponds to an increase in the number of nesting females
    - <u>Northern Recovery Unit</u>

      (1) There is statistical confidence (95 percent) that the annual rate of increase over a generation time of 50 years is 2 percent or greater resulting in a total annual number of nests of 14,000 or greater for this recovery unit (approximate distribution of nests by state is NC=14 percent [2,000], SC=66 percent [9,200], and GA=20 percent [2,800]).

      (2) This increase in number of nests must be a result of corresponding increases in number of nesting females (estimated from nests, clutch frequency, and remigration interval).

- Peninsular Florida Recovery Unit

  (1) There is statistical confidence (95 percent) that the annual rate of increase over a generation time of 50 years is statistically detectable (1 percent), resulting in a total annual number of nests of 106,100 or greater for this recovery unit.

  (2) This increase in number of nests must be a result of corresponding increases in number of nesting females (estimated from nests, clutch frequency, and remigration interval).

- Dry Tortugas Recovery Unit

  (1) There is statistical confidence (95 percent) that the annual rate of increase over a generation time of 50 years is 3 percent or greater, resulting in a total annual number of nests of 1,100 or greater for this recovery unit.

  (2) This increase in number of nests must be a result of corresponding increases in number of nesting females (estimated from nests, clutch frequency, and remigration interval).

- Northern Gulf of Mexico Recovery Unit

  (1) There is statistical confidence (95 percent) that the annual rate of increase over a generation time of 50 years is 3 percent or greater resulting in a total annual number of nests of 4,000 or greater for this recovery unit (approximate distribution of nests (2002-2007) is FL=92 percent [3,700] and AL=8 percent [300]).

  (2) This increase in number of nests must be a result of corresponding increases in number of nesting females (estimated from nests, clutch frequency, and remigration interval).

- Greater Caribbean Recovery Unit

  (1) The total annual number of nests at a minimum of three nesting assemblages, averaging greater than 100 nests annually (e.g., Yucatán, Mexico; Cay Sal Bank, The Bahamas) has increased over a generation time of 50 years.

  (2) This increase in number of nests must be a result of corresponding increases in number of nesting females (estimated from nests, clutch frequency, and remigration interval).

• Ensure the in-water abundance of juveniles in both neritic and oceanic habitats is increasing and is increasing at a greater rate than strandings of similar age classes.

  - Trends in Abundance on Foraging Grounds:

    A network of in-water sites, both oceanic and neritic, distributed across the foraging range is established and monitoring is implemented to measure abundance. There is statistical confidence (95 percent) that a composite estimate of relative abundance from these sites is increasing for at least one generation.

  - Trends in Neritic Strandings Relative to In-water Abundance:

    Stranding trends are not increasing at a rate greater than the trends in in-water relative abundance for similar age classes for at least one generation.

The potential lethal take of two loggerhead sea turtles during the 10-year CSAR training operations period is not likely to reduce population numbers over time due to current population sizes and expected recruitment. Non-lethal takes of sea turtles would not affect the adult female nesting population or number of nests per nesting season. Thus, the proposed action is not in opposition to the recovery objectives above and will not result in an appreciable reduction in the likelihood of loggerhead sea turtles' recovery in the wild.

Kemp's Ridley Sea Turtles
The proposed action may result in up to two lethal or non-lethal Kemp's ridley sea turtle takes, during a 10-year period.

Two non-lethal takes of Kemp's ridley sea turtles over a 10-year period is not expected to have any measurable impact on the reproduction, numbers, or distribution of this species. The individuals are expected to fully recover such that no reductions in reproduction or numbers of this species are anticipated. Since these takes may occur anywhere in the action area and would be released within the general area where caught, no change in the distribution of Kemp's ridley sea turtles is anticipated.

The lethal take of up to two Kemp's ridley turtles over 10 years would reduce the species' population, compared to the number that would have been present in the absence of the proposed action, assuming all other variables remained the same. A lethal take could also result in a potential reduction in future reproduction, assuming the individual was a female and would have survived to reproduce in the future. The annual loss of one adult female sea turtle, on average, could preclude the production of thousands of eggs and hatchlings, of which a fractional percentage is expected to survive to sexual maturity. Thus, the death of a female eliminates that individual's contribution to future generations, and the action will result in a reduction in sea turtle reproduction. The anticipated take is expected to occur anywhere in the action area and sea turtles generally have large ranges in which they disperse; thus, no reduction in the distribution of Kemp's ridley sea turtles is expected from these takes.

Whether the reductions in numbers and reproduction of these species attributed to the CSAR training operations would appreciably reduce their likelihood of survival depends on the probable effect the changes in numbers and reproduction would have relative to current population sizes and trends.

The total population of Kemp's ridleys is not known, but nesting has been increasing significantly in the past several years (9 to 13 percent per year) with over 15,000 nests recorded in 2007 (Gladys Porter Zoo 2007). Kemp's ridleys mature and nest at an age of 7-15 years, which is earlier than other chelonids. A younger age at maturity may be a factor in the response of this species to recovery actions. A period of steady increase in benthic immature ridleys has been occurring since 1990 and appears to be due to increased hatchling production and an apparent increase in survival rates of immature sea turtles. The increased survivorship of immature sea turtles is largely attributable to the introduction of turtle excluder devices (TEDs) in the U.S. and Mexican shrimping fleets and Mexican beach protection efforts. The TEWG (2000) projected that Kemp's ridleys could reach the Recovery Plan's intermediate recovery goal of 10,000 nesters by the year 2015.

Although the anticipated mortality would result in a reduction in absolute population numbers, it is not likely this reduction would appreciably reduce the likelihood of survival of Kemp's ridley sea turtles. If the hatchling survival rate to maturity is greater than the mortality rate of the population, the loss of breeding individuals would be replaced through recruitment of new breeding individuals from successful reproduction of non-taken sea turtles. Considering that Kemp's ridley nesting trends are increasing, we believe the loss of up to two individuals over a 10-year period will not have any measurable effect on that trend.

Based on the above analysis, we believe the proposed action is not reasonably expected to cause, directly or indirectly, an appreciable reduction in the likelihood of survival of Kemp's ridley sea turtles in the wild.

The recovery plan for Kemp's ridley sea turtles (USFWS and NMFS 1992) lists the following relevant recovery objective:

- Attain a population of at least 10,000 females nesting in a season.
  - An estimated 4,047 females nested in 2006, which is a substantial increase from the 247 nesting females estimated during the 1985-nesting season (P. Burchfield, Gladys Porter Zoo, personal communication, 2007, in NMFS and USFWS 2007c).
  - In 2007, an estimated 5,500 females nested in the state of Tamaulipas from May 20-22 (P. Burchfield, Gladys Porter Zoo, personal communication, 2007, in NMFS and USFWS 2007c).
  - 10,000 nesting females in a season = about 30,000 nests (NMFS and USFWS 2007c).

The potential lethal take of two Kemp's ridley sea turtles during the 10-year CSAR training operations period is not likely to reduce population numbers over time due to current population sizes and expected recruitment. Non-lethal takes of sea turtles would not affect the adult female nesting population or number of nests per nesting season. Thus, the proposed action is not in opposition to the recovery objectives above and will not result in an appreciable reduction in the likelihood of Kemp's ridley sea turtles' recovery in the wild.

Green Sea Turtles
The proposed action may result in two lethal or non-lethal green sea turtle takes during a 10-year period.

The potential non-lethal take of two green sea turtles during a 10-year period is not expected to have any measurable impact on the reproduction, numbers, or distribution of these species. The individuals are expected to fully recover such that no reductions in reproduction or numbers of green sea turtles are anticipated. Since these takes may occur anywhere in the action area and would be released within the general area where caught, no change in the distribution of green sea turtles is anticipated.

The potential lethal take of two green sea turtles over 10 years would reduce the number of green sea turtles, compared to their numbers in the absence of the proposed action, assuming all other variables remained the same. A lethal take could also result in a reduction in future reproduction, assuming the individual was female and would have survived to reproduce. For example, an adult green sea turtle can lay 1-7 clutches (usually 2-3) of eggs every 2 to 4 years, with 110-115 eggs/nest. The annual loss of an adult female sea turtle, on average, could preclude the production of thousands of eggs and hatchlings, of which a fractional percentage are expected to survive to sexual maturity. The anticipated lethal take is expected to occur anywhere in the action area and sea turtles generally have large ranges in which they disperse; thus, no reduction in the distribution of green sea turtles is expected from these takes.

Whether the reductions in numbers and reproduction of these species attributed to the CSAR training operations would appreciably reduce their likelihood of survival depends on the probable effect the changes in numbers and reproduction would have relative to current population sizes and trends.

The 5-year status review for green sea turtles states that of the seven green sea turtle nesting concentrations in the Atlantic basin for which abundance trend information is available, all were determined to be either stable or increasing (NMFS and USFWS 2007a). That review also states that the annual nesting female population in the Atlantic basin ranges from 29,243-50,539 individuals. Additionally, the pattern of green sea turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of index beaches in Florida in 1989. An average of 5,039 green turtle nests were laid annually in Florida between 2001 and 2006 with a low of 581 in 2001 and a high of 9,644 in 2005 (NMFS and USFWS 2007a).

Although the anticipated mortality would result in an instantaneous reduction in absolute population numbers, the U.S. populations of green sea turtles would not be appreciably affected. For a population to remain stable, sea turtles must replace themselves through successful reproduction at least once over the course of their reproductive lives, and at least one offspring must survive to reproduce itself. If the hatchling survival rate to maturity is greater than the mortality rate of the population, the loss of breeding individuals would be replaced through recruitment of new breeding individuals from successful reproduction of non-taken sea turtles. Since the abundance trend information for green sea turtles is either stable or increasing, we believe the loss of two green sea turtles over a 10-year period will have no measurable effect on that trend.

Based on the above analysis, we believe the proposed action is not reasonably expected to cause, directly or indirectly, an appreciable reduction in the likelihood of survival of the green sea turtles in the wild.

The Atlantic Recovery Plan for the population of Atlantic green sea turtles (NMFS and USFWS 1991b) lists the following relevant recovery objectives over a period of 25 continuous years:

- The level of nesting in Florida has increased to an average of 5,000 nests per year for at least 6 years;

- Green turtle nesting in Florida over the past 6 years has been documented as follows: 2001 – 581 nests, 2002 – 9,201 nests, 2003 – 2,622, 2004 – 3,577 nests, 2005 – 9,644 nests, and 2006 – 4,970 nests. This averages 5,039 nests annually over the past 6 years (NMFS and USFWS 2007a).

- A reduction in stage class mortality is reflected in higher counts of individuals on foraging grounds.
  - Several actions are being taken to address this objective; however, there are currently no estimates available specifically addressing changes in abundance of individuals on foraging grounds.

The potential lethal take of two green sea turtles during the 10-year CSAR training operations period is not likely to reduce population numbers over time due to current population sizes and expected recruitment. Non-lethal takes of sea turtles would not affect the adult female nesting population or number of nests per nesting season. Thus, the proposed action is not in opposition to the recovery objectives above and will not result in an appreciable reduction in the likelihood of green sea turtles' recovery in the wild.

Hawksbill Sea Turtles
The proposed action may result in up to two lethal or non-lethal hawksbill sea turtle takes during a 10-year period.

The non-lethal take of up to two hawksbill sea turtles is not expected to have any measurable impact on the reproduction, numbers, or distribution of this species. The individual is expected to fully recover such that no reductions in reproduction or numbers of these species are anticipated. Since the takes may occur anywhere in the action area and would be released within the general area where caught, no change in the distribution of hawksbill sea turtles is anticipated.

The lethal take of up to two hawksbill sea turtles over a 10-year period would reduce their population, compared to the number that would have been present in the absence of the proposed action, assuming all other variables remained the same. A lethal take could also result in a potential reduction in future reproduction, assuming the individual was a female and would have survived to reproduce in the future. An adult hawksbill sea turtle can lay 3-5 clutches of eggs every few years (Meylan and Donnelly 1999, Richardson et al. 1999) with up to 250 eggs/nest (Hirth 1980). The annual loss of one adult female sea turtle, on average, could preclude the production of thousands of eggs and hatchlings, of which a fractional percentage is expected to survive to sexual maturity. Thus, the death of a female eliminates that individual's contribution to future generations, and the action will result in a reduction in sea turtle reproduction. The anticipated take is expected to occur anywhere in the action area and sea turtles generally have large ranges in which they disperse; thus, no reduction in the distribution of hawksbill sea turtles is expected from the take of two individuals.

Whether the reductions in numbers and reproduction of these species attributed to the CSAR training operations would appreciably reduce their likelihood of survival depends on the probable effect the changes in numbers and reproduction would have relative to current population sizes and trends.

The 5-year status review for hawksbill sea turtles states their populations appear to be increasing or stable at the two principal nesting beaches in the U.S. Caribbean where long-term monitoring has been carried out: Mona Island, Puerto Rico, and Buck Island Reef National Monument (BIRNM), St. Croix, USVI (NMFS and USFWS 2007b). Mona Island hosts between 199-332 nesting females per season, while 56 females nest at BIRNM per season (NMFS and USFWS 2007b). Although today's nesting population is only a fraction of what it was historically (i.e., 20 to 100 years ago), nesting activity in recent years by hawksbills has increased on well-protected beaches in Mexico, Barbados, and Puerto Rico (Caribbean Conservation Corporation 2005). Increasing protections for live coral habitat over the last decade in the Atlantic, Gulf of Mexico, and Caribbean may also increase survival rates of hawksbills in the marine environment.

Although the anticipated mortality would result in a reduction in absolute population numbers, it is not likely this small reduction would appreciably reduce the likelihood of survival of hawksbill sea turtles. If the hatchling survival rate to maturity is greater than the mortality rate of the population, the loss of breeding individuals would be replaced through recruitment of new breeding individuals from successful reproduction of non-taken sea turtles. Considering that this species' nesting trends are either stable or increasing, we believe the loss of up to two hawksbill sea turtles over ten years will not have any measurable effect on those trends.

Based on the above analysis, we believe the proposed action is not reasonably expected to cause, directly or indirectly, an appreciable reduction in the likelihood of survival of this species of sea turtle in the wild.

The Recovery Plan for the population of the hawksbill sea turtles (NMFS and USFWS 1993) lists the following relevant recovery objectives over a period of 25 continuous years:

- The adult female population is increasing, as evidenced by a statistically significant trend in the annual number of nests at five index beaches, including Mona Island and Buck Island Reef National Monument;
    - Of the rookeries regularly monitored: Jumby Bay (Antigua/Barbuda), Barbados, Mona Island, and Buck Island Reef National Monument all show increasing trends in the annual number of nests (NMFS and USFWS 2007b).
- The numbers of adults, subadults, and juveniles are increasing, as evidenced by a statistically significant trend on at least five key foraging areas within Puerto Rico, USVI, and Florida.
    - In-water research projects at Mona Island, Puerto Rico, and the Marquesas, Florida, which involve the observation and capture of juvenile hawksbill turtles, are underway. Although there are 15 years of data for the Mona Island project, abundance indices have not yet been incorporated into a rigorous analysis or a published trend assessment. The time series for the Marquesas project is not long enough to detect a trend (NMFS and USFWS 2007b).

The potential lethal take of two hawksbill sea turtles during the 10-year CSAR training operations period is not likely to reduce population numbers over time due to current population sizes and expected recruitment. Non-lethal takes of sea turtles would not affect the adult female nesting population or number of nests per nesting season. Thus, the proposed action is not in opposition to the recovery objectives above and will not result in an appreciable reduction in the likelihood of hawksbill sea turtles' recovery in the wild.

Leatherback Sea Turtles
The proposed action may result in up to two lethal or non-lethal leatherback sea turtle takes, during a 10-year period.

Two non-lethal takes of leatherback sea turtles over a 10-year period is not expected to have any measurable impact on the reproduction, numbers, or distribution of this species. The individuals are expected to fully recover such that no reductions in reproduction or numbers of this species are anticipated. Since these takes may occur anywhere in the action area and would be released within the general area where caught, no change in the distribution of leatherback sea turtles is anticipated.

The lethal take of up to two leatherback turtles over 10 years would reduce the species' population, compared to the number that would have been present in the absence of the proposed action, assuming all other variables remained the same. A lethal take could also result in a potential reduction in future reproduction, assuming the individual was a female and would have survived to reproduce in the future. The annual loss of one adult female sea turtle, on average, could preclude the production of thousands of eggs and hatchlings, of which a fractional percentage is expected to survive to sexual maturity. Thus, the death of a female eliminates that individual's contribution to future generations, and the action will result in a reduction in sea turtle reproduction. The anticipated take is expected to occur anywhere in the action area and sea turtles generally have large ranges in which they disperse; thus, no reduction in the distribution of leatherback turtles is expected from these takes.

Whether the reductions in numbers and reproduction of this species attributed to the CSAR training operations would appreciably reduce their likelihood of survival depends on the probable effect the changes in numbers and reproduction would have relative to current population sizes and trends.

The Leatherback Turtle Expert Working Group estimates there are between 34,000-95,000 total adults (20,000-56,000 adult females; 10,000-21,000 nesting females) in the North Atlantic. Of the five leatherback populations or groups of populations in the North Atlantic, three show an increasing or stable trend (Florida, Northern Caribbean, and Southern Caribbean). This includes the largest nesting population, located in the Southern Caribbean at Suriname and French Guiana. Of the remaining two populations, there is not enough information available on the West African population to conduct a trend analysis, and, for the Western Caribbean, a slight decline in annual population growth rate was detected (TEWG 2007).[2]

[2] An annual growth rate of 1.0 is considered a stable population; the growth rates of two nesting populations in the Western Caribbean were 0.98 and 0.96 (TEWG 2007).

Although the anticipated mortality would result in a reduction in absolute population numbers, it is not likely this small reduction would appreciably reduce the likelihood of survival of either of leatherback sea turtles. If the hatchling survival rate to maturity is greater than the mortality rate of the population, the loss of breeding individuals would be replaced through recruitment of new breeding individuals from successful reproduction of non-taken sea turtles. Considering that this species' nesting trends are either stable or increasing, we believe the loss of up to two leatherback sea turtles every ten years will not have any measurable effect on those trends.

Based on the above analysis, we believe the proposed action is not reasonably expected to cause, directly or indirectly, an appreciable reduction in the likelihood of survival of this species of sea turtle in the wild.

The Atlantic recovery plan for the U.S. population of the leatherback sea turtles (NMFS and USFWS 1992) lists the following relevant recovery objective:

The adult female population increases over the next 25 years, as evidenced by a statistically significant trend in the number of nests at Culebra, Puerto Rico; St. Croix, USVI; and along the east coast of Florida.

- In Puerto Rico, the main nesting areas are at Fajardo on the main island of Puerto Rico and on the island of Culebra. Between 1978 and 2005, nesting increased in Puerto Rico from a minimum of 9 nests recorded in 1978 and to a minimum of 469-882 nests recorded each year between 2000 and 2005. Annual growth rate was estimated to be 1.1 with a growth rate interval between 1.04 and 1.12, using nest numbers between 1978 and 2005 (NMFS and USFWS 2007d).
- In the U.S. Virgin Islands, researchers estimated a population growth of approximately 13 percent per year on Sandy Point National Wildlife Refuge from 1994 through 2001. Between 1990 and 2005, the number of nests recorded has ranged from 143 (1990) to 1,008 (2001). The average annual growth rate was calculated as approximately 1.10 (with an estimated interval of 1.07 to 1.13) (NMFS and USFWS 2007d).
- In Florida, a Statewide Nesting Beach Survey program has documented an increase in leatherback nesting numbers from 98 (1989) to 800-900 (early 2000s). Based on standardized nest counts made at Index Nesting Beach Survey sites surveyed with constant effort over time, there has been a substantial increase in leatherback nesting in Florida since 1989. The estimated annual growth rate was approximately 1.18 (with an estimated 95 percent interval of 1.1 to 1.21) (NMFS and USFWS 2007d).

The potential lethal take of up to two sea turtles annually, in any combination of species, during the next 10 years is not likely to reduce population numbers over time due to current population sizes and expected recruitment. It is unlikely to have any detectable influence on the trends noted above. Non-lethal takes of sea turtles would not affect the adult female nesting populations or numbers of nests per nesting season. Thus, the proposed action is not in opposition to the recovery objectives above, and is not likely to result in an appreciable reduction in the likelihood of recovery in the wild.

8.0 CONCLUSION

We have analyzed the best available data, the current status of the species, environmental baseline, effects of the proposed action, and cumulative effects and determined that the proposed action is not likely to jeopardize the continued existence of loggerhead, Kemp's ridley, green, hawksbill, or leatherback sea turtles in the Atlantic Basin (including the Gulf of Mexico.)

Our sea turtle analyses focused on the impacts and population response of sea turtles in the Atlantic Basin. However, the impact of the effects of the proposed action on the Atlantic Basin populations must be directly linked to the global populations of the species, and the final jeopardy analysis is for the global populations as listed in the ESA. Because the proposed action will not reduce the likelihood of survival and recovery of Atlantic Basin populations of loggerhead, Kemp's ridley, green, hawksbill, and leatherback sea turtles, it is our opinion that the proposed CSAR training operations in the WTA is also not likely to jeopardize the continued existence of these sea turtles species worldwide.

9.0 INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and protective regulations issued pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the RPMs and terms and conditions of the ITS.

9.1 Anticipated Amount or Extent of Incidental Take

Based on the above information and analyses, we believe that the proposed action will have adverse effects on loggerhead, Kemp's ridley, green, hawksbill, and leatherback sea turtles. These effects will result from ingestion of marine debris associated with the project. We anticipate that the proposed action will result in two lethal or non-lethal sea turtle takes, of any combination of species, over a 10-year period.

9.2 Effect of the Take

We have determined the anticipated incidental take specified in Section 9.1 is not likely to jeopardize the continued existence of listed sea turtles.

9.3 Reasonable and Prudent Measures (RPMs)

Section 7(b)(4) of the ESA requires NMFS to issue a statement specifying the impact of any incidental take on listed species, which results from an agency action otherwise found to comply with section 7(a)(2) of the ESA. It also states that the RPMs necessary to minimize the impacts of take and the terms and conditions to implement those measures must be provided and must be followed to minimize those impacts. Only incidental taking by the federal agency or applicant that complies with the specified terms and conditions is authorized.

The RPMs and terms and conditions are specified as required by 50 CFR 402.14 (i)(1)(ii) and (iv) to document the incidental take by the proposed action and to minimize the impact of that take on sea turtles. These measures and terms and conditions are non-discretionary, and must be implemented by the USAF in order for the protection of section 7(o)(2) to apply. The USAF has a continuing duty to regulate the activity covered by this ITS. If the USAF fails to adhere to the terms and conditions of the ITS through enforceable terms, and/or fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of the incidental take, the USAF must report the progress of the action and its impact on the species to NMFS as specified in the ITS [50 CFR 402.14(i)(3)].

NMFS has determined that the following RPMs are necessary and appropriate to minimize impacts of the incidental take of sea turtles during the proposed action. The following RPMs and associated terms and conditions are established to implement these measures, and to document incidental takes. Only incidental takes that occur while these measures are in full implementation are authorized. These restrictions remain valid until reinitiation and conclusion of any subsequent section 7 consultation.

1. The USAF shall continue to develop and improve their program aimed at helping to understand the dynamics and effects of marine debris ingestion by sea turtles and to decrease the interactions between sea turtles and marine debris.

2. To the maximum extent practicable, the USAF shall decrease the amount of debris discarded due to the proposed action and monitor the effects of marine debris associated with the proposed action.

3. The USAF shall monitor the effects of the project on sea turtles.

9.4 Terms and Conditions

In order to be exempt from liability for take prohibited by section 9 of the ESA, the USAF must fully comply with the following terms and conditions that implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

The following terms and conditions implement RPM No. 1:

1. The USAF shall update their study reviewing the current knowledge of marine debris ingestion and its effects on sea turtles, identifying sources and movements of debris throughout the Gulf of Mexico, estimating the amount of debris introduced annually to the Gulf of Mexico, and estimating the annual mortality of sea turtles due to debris ingestion. The updated study shall be completed within three years of issuance of this ITS and reported to NMFS at the address listed at the end of this section. This information will be used by the USAF to better determine its impact with respect to

debris introduced as part of the proposed action, and to better estimate where that debris might travel for possible retrieval in the future.

2. The USAF shall update their awareness program describing the dangers to sea life from marine debris. The updated program materials shall be made available to the Department of Defense installations with marine boundaries in the Gulf of Mexico, especially those with marinas. This shall be completed within two years of issuance of this ITS and reported to NMFS at the address listed at the end of this section.

The following terms and conditions implement RPM No. 2:

3. The USAF shall collect as many lightsticks, sea dye packs, and flares as possible after completion of an exercise. All plastic wrappings associated with the training materials will be disposed of properly so as not to become marine debris.

4. The USAF shall use the minimum amount of training materials necessary to complete operations and shall use no more than those listed in Table 1 (14,000 lightsticks, 1,450 sea dye packs, and 2,550 flares) per calendar year.

The following terms and conditions implement RPM No. 3:

5. Based on the data obtained during the previous 10-year CSAR training operations, the USAF shall determine the "pre-action" 10-year average percentage of total stranded sea turtles necropsied that had ingested plastic versus the total number necropsied. After the start of the currently proposed training activities, the USAF shall use this "pre-action" 10-year average percentage as a baseline to compare the subsequent annual stranding records of sea turtles on the Florida Gulf Coast. If any of the annual percentages of total stranded sea turtles necropsied that had ingested plastic versus the total number necropsied during the current CSAR training period exceeds the 10-year "pre-action" average by a statistically significant amount, the USAF will work with NMFS and the Florida STSSN coordinator to determine if activities associated with the proposed action are responsible. If so, then the USAF shall develop new ways to further limit the amount of plastic debris abandoned as part of the proposed action (e.g., by investigating/developing biodegradable options for training materials.)

6. The USAF shall provide an example of the lightsticks and sea dye packs used for training operations, as well as the contact information for the Natural Resources Manager for Moody AFB, to the Florida STSSN coordinator prior to the start of the proposed action. Due to potential safety concerns and the unlikelihood that sea turtles will ingest flares, examples of the flares will not be provided to the Florida STSSN coordinator; however, the USAF shall inform the Florida STSSN coordinator that they may see examples of flares and be given a demonstration of flare training activities by explosives ordnance disposal personnel from Moody AFB. The USAF shall contact the coordinator at least annually to determine: (1) the number of sea turtles necropsied, (2) the number of necropsied sea turtles determined to have ingested plastic, and (3) the likelihood that the ingested plastic originated from the CSAR training operations. Additionally, if the

Florida STSSN coordinator contacts the Natural Resources Manager for Moody AFB to report ingestion of CSAR training materials by a sea turtle, the USAF will immediately contact the NMFS Assistant Regional Administrator for Protected Resources at (727) 824-5312.

7. The USAF shall provide an annual report to the NMFS Assistant Regional Administrator for Protected Resources at the following address. This report will address the status of the marine debris study, the status of the public awareness program, the amount of training materials used and collected as part of the proposed action during the calendar year, the information obtained from the Florida STSSN (as described in #6), and whether the annual percentage of total stranded sea turtles necropsied that had ingested plastic versus the total number necropsied during the current CSAR training period exceeds the 10-year "preaction" average by a statistically significant amount.

NMFS Southeast Regional Office
Assistant Regional Administrator
Protected Resources Division
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10.0 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

NMFS believes the following conservation recommendations further the conservation of listed species. NMFS strongly recommends that these measures be considered and implemented, and requests to be notified of their implementation.

1. The USAF should attempt to minimize the harmful effects of marine debris by using non-toxic, biodegradable alternatives for training materials.

2. The USAF should determine ways to improve their rate of retrieving and properly disposing of deployed training materials when training operations are completed.

3. The USAF should make every effort to retrieve and properly dispose of any marine debris encountered during CSAR training operations, including marine debris that did not originate from the proposed action.

In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, NMFS requests notification of the implementation of any conservation recommendations.

11.0 REINITIATION OF CONSULTATION

As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (2) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion, or (3) a new species is listed or critical habitat designated that may be affected by the identified action.

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ATTACHMENT A

Summary of annual incidental take levels anticipated under the incidental take statements associated with NMFS' existing biological opinions in the U.S. Atlantic and Gulf of Mexico.

Federal Action	**Sea Turtle Species[1]**				
	Loggerhead	**Leatherback**	**Green**	**Kemp's Ridley**	**Hawksbill**
Coast Guard Vessel Operation	1 (combined)				
Navy – SE Ops Area[3]	91	17	16	16	4
Navy – NE Ops Area	10	0	1	1	0
Shipshock – Seawolf/Winston Churchill	276 (No more than 58 lethal)	276 (No more than 58 lethal)	276 (No more than 58 lethal)	276 (No more than 58 lethal)	276 (No more than 58 lethal)
COE Dredging – NE Atlantic	27	1	6	5	0
COE Dredging – S. Atlantic	35	0	7	7	2
COE Dredging – N & W Gulf of Mexico	30	0	8	14	2
COE Dredging – E Gulf of Mexico	8[4]	5[4]	5[4]	5[4]	5[4]
COE Rig Removal, Gulf of Mexico	1	1	1	1	1
MMS Destin Dome Lease Sales	1[5]	1[5]	1[5]	1[5]	1[5]
MMS Rig Removal, Gulf of Mexico	10[6]	5[6]	5[6]	5[6]	5[6]
Dolphin/Wahoo Fishery	16 (No more than 2 lethal)	16 (No more than 1 lethal)	2 (No more than 1 lethal)	2 (No more than 1 lethal)	2 (No more than 1 lethal)
NE Multispecies Sink Gillnet Fishery	10	4	4	2	0
ASMFC Lobster Plan	10	4	0	0	0
Bluefish Fishery	6 (No more than 3 lethal)	0	0	6	0
Herring Fishery	6 (No more than 3 lethal)	1	1	1	0
Mackeral, Squid, Butterfish Fisheries	6 (No more than 3 lethal)	1	2	2	0
Monkfish Fishery	6 (No more than 3 lethal)	1	1	1	0

Federal Action	Sea Turtle Species[1]				
	Loggerhead	**Leatherback**	**Green**	**Kemp's Ridley**	**Hawksbill**
Dogfish Fishery	6 (No more than 3 lethal)	1	1	1	0
Sargassum Fishery	15	1	1	1	1
Summer Flounder, Scup, and Black Sea Bass Fishery	15 (No more than 5 lethal)	3	3	3	3
Shrimp Fishery[8]	163,160 (No more than 3,948 lethal)	3,090 (No more than 80 lethal)	155,503 (No more than 4,208 lethal)	18,757 (No more than 514 Lethal)	640[11] (All lethal)
Weakfish Fishery	20	0	0	2	0
HMS – Pelagic Longline Fishery	1,905	1,764	105 (combined)		
HMS – Shark Fishery	679 (No more than 346 lethal)	74 (No more than 47 lethal)	2 (No more than 1 lethal)	2 (No more than 1 lethal)	2 (No more than 1 lethal)
NRC – St. Lucie, FL[10]	1000 (No more than 10 lethal)	1000 (No more than 1 lethal)	1000 (No more than 10 lethal)	1000 (No more than 1 lethal)	1000 (No more than 1 lethal)
NRC – Brunswick, NC	50 (No more than 6 lethal)	50	50 (No more than 3 lethal)	50 (No more than 2 lethal)	50
NRC – Crystal River, FL	55 (No more than 1 lethal)	55 (No more than 1 lethal)	55 (No more than 1 lethal)	55 (No more than 1 lethal)	55 (No more than 1 lethal)

[1]Anticipated Take level represents 'lethal' unless otherwise noted.
[2]Includes Navy Operations along the Atlantic Coasts and Gulf of Mexico, Mine warfare center, Eglin AFB, Moody AFB
[3]Total estimated take includes acoustic harassment
[4]Up to 8 sea turtles total, of which, no more than 5 may be leatherbacks, greens, Kemp's or hawksbill, in combination.
[5]Total anticipated take is 3 sea turtles of any combination over a 30-year period
[6]Not to exceed 25 sea turtles, in total.
[7]Anticipated take for post-hatchlings over a 5-year period
[8]Represents estimated take (interactions between sea turtles and trawls). Lethal take in parentheses.
[10]Annual incidental capture of up to 1,000 sea turtles, in any combination of the five species found in the action area. NOAA Fisheries anticipates 1 percent of the total number of green and loggerhead sea turtles (combined) captured (i.e., if there are 900 total green and loggerhead sea turtles captured in one year, then 9 sea turtles in any combination of greens and loggerheads are expected to be injured or killed as a result. In cases where 1 percent of the total is not a whole number, then the total allowable incidental take due to injury or death will be rounded to the next higher whole number) will be injured or killed each year over the next 10 years as a result of this incidental capture. NOAA Fisheries also anticipates two Kemp's ridley sea turtles will be killed each year and one hawksbill or leatherback sea turtle will be injured or killed every 2 years for the next 10 years.
[11]Actual mortalities of hawksbills, as a result of sea turtle/trawl interactions, is expected to be much lower than this number. This number represents the estimated total number of mortalities of hawksbill sea turtles from all sources in areas where shrimp fishing takes place.

ATTACHMENT B

Summary of annual incidental take levels anticipated under the incidental take statements associated with NMFS' existing biological opinions in the Gulf of Mexico.

Fishery	Sea Turtle Species				
	Loggerhead	**Leatherback**	**Kemp's Ridley**	**Green**	**Hawksbill**
Coastal Migratory Pelagic	33 (No more than 33 lethal)	2 (No more than 2 lethal)	4 (No more than 4 lethal)	14 (No more than 14 lethal)	2 (No more than 2 lethal)
Gulf Reef Fish[1]	281 (No more than 78 lethal)	29 (No more than 9 lethal)	4 (No more than 1 lethal)	72 (no more than 21 lethal)	57 (no more than 13 lethal)
Southeastern U.S. Shrimp	163,160 (No more than 3,948 lethal)	3,090 (No more than 80 lethal)	155,503 (No more than 4,208 lethal)	18,757 (No more than 514 Lethal)	640 (All lethal)
Atlantic Pelagic Longline[2]	1,905	1,764	105 (combined)		
Atlantic HMS-Shark Fisheries	679 (No more than 346 lethal)	74 (No more than 47 lethal)	2 (No more than 1 lethal)	2 (No more than 1 lethal)	2 (No more than 1 lethal)

[1]Includes Bottom longline, Commerical vertical line, and Recreational vertical line.

[2]All takes are lethal for the Atlantic Pelagic Longline